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NEWSPAPER

DPers in Finance Earning Less

By Catherine Arnst
Of the CW Staff

WILLOW GROVE, Pa. – If you're a DP employee in a bank, insurance company or other financial institution, you're probably earning less than DPers doing the same work in other industries, according to the results of a salary survey published by the Administrative Management Society (AMS).

Systems analysts in the financial industry are paid an average of $24 less per week than the national average of $304 and programmers make $15 less than the national average of $261, the survey showed.

But those two job categories garnered the highest salaries in the manufacturing and processing industry, where systems analysts are paid $21 more and programmers $11 more than the national averages.

AMS surveyed 52,803 DPera in seven job categories employed by 4,895 U.S. companies in five industries. Besides the financial and manufacturing and processing industries, the survey covered retail and wholesale, government and "all other" industries.

The seven DP job categories included systems analysts, programmers, entry-level and advanced computer operatora, tabulating machine operatora and entry-level and advanced keypunch operatora. Salaries quoted were those in effect last Feb. 3.

Between 1975 and 1976, DP salaries increased more than those of the other office workers surveyed, the national averages showed. The largest jump was made by entry-level keypunch operatora, whose salaries went up 9.9%.

The salaries of computer operators climbed 7.7%, programmers and systems analysts' wages rose 6.5% and 6.7% respectively, advanced keypunch operators' salaries increased 6% and tabulating machine operators experienced a 4.9% pay increase.

The survey, which was broken down into geographical regions, showed the highest salaries are paid in the western region of the U.S. in every category except tabulating machine operators, who are paid highest in the east central region.

The difference between the average salary in the lowest and highest geographical regions generally hovers around the $20 mark, except for programmers. They receive an average weekly salary of $325 in the west, but their salaries drop $27, to $298, in the west central

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COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
Weekly Newspaper Second-class postage paid at Boston, Mass., and additional mailing offices © 1976 by Computerworld, Inc.

Price: $15/year October 25, 1976 Vol. X, No. 43

CW Looks at DBMS

Data Base Systems To Spawn New CPUs

By Don Leavitt
Of the CW Staff

SAN FRANCISCO – Data base management is leading to the development of a new type of processor – a machine that will make "today's number-crunching systems as obsolete as the dinosaur," Dr. George E. Mueller, president of System Development Corp., said here last week.

This new type of processor – optimized for data base operations – will be developed in the next five to 10 years, he predicted at a seminar sponsored by the American Institute of Industrial Engineers.

CW Special Report on Data Base Management Systems follows Page 32.

Mueller called today's computers "wonderfully efficient at performing complex mathematical calculations," but "woefully deficient at all those storing, sorting and fetching operations that are involved in data base management."

The new type of processor he envisions will have "strikingly different" architecture but not be expensive to develop.

Though Mueller sees "no insurmountable technical barriers" to these new processors, he said legislative confusion over privacy is "a stumbling block that could cause significant delays" in their use.

The Privacy Act of 1974 and various state laws seem based on the idea that, since computers permit better records,

(Continued on Page 4)

'Executive Suite' at Trial

Top IBMers Subpoenaed, Never Testify

By Edith Holmes
Of the CW Staff

NEW YORK – Seven members of IBM's top executive suite – including Board Chairman Frank T. Cary – appeared at the U.S. vs. IBM antitrust trial here last week in response to Justice Department subpoenas.

But they never spoke a word in testimony.

The seven appeared as ordered, one from as far away as Paris, to respond to the "last resort orders" backed by Judge David N. Edelstein. The subpoenas were requested by lead government counsel Raymond Carlson because the Justice Department thought the IBM seven might know something about two IBM documents introduced as evidence at the beginning of the month.

Lead IBM attorney Thomas D. Barr said he was outraged the executives had been called to appear but not called upon to testify.

Tracing the "tortured history" of the two IBM documents, Barr said he relied on an only partially successful weekend search of IBM's files to determine who had written the documents, why they had been written and to whom.

Carlson said he was temporarily satisfied with Barr's explanation and therefore would not put Cary and the other IBM executives on the stand.

The judge, however, was not so calm.

"We have seven witnesses here. What is your call? What will we do? Do you need testimony from these witnesses or will you accept the representation of Mr. Barr that none of them know anything about these two documents?" the judge asked Carlson.

(Continued on Page 6)

Model Predicts Large Oil Spill On East Coast Within 25 Years

By John P. Hebert
Of the CW Staff

WASHINGTON, D.C. – Residents of the northeastern U.S. may see a large pool of oil advancing on their coastal areas within the next 25 years if government computer simulations prove accurate.

Given current drilling and oil cleanup technologies, there is a 23% chance a spill will occur as a direct result of oil drilling in the undersea Georges Bank petroleum fields off the coast of Massachusetts, according to worst-case oil risk analyses performed by the U.S. Geological Survey (USGS).

The results of that analysis, published recently in a 1,200-page report by the U.S. Interior Department's Bureau of Land Management (BLM) here, will be used as the basis of a draft environmental impact statement to help the Secretary of the Interior decide whether to auction off exploratory rights on Georges Bank to U.S. oil companies next spring.

The USGS' risk analyses, made on its tandem 4M-byte IBM 370/155 systems, were only feasible with the aid of large-scale computers, according to Dick Smith, who headed the survey's simulation effort.

The 15.8 million-acre tract was reduced to about 1.73 million acres for oil drilling exploration in response to pleas submitted to BLM from northeastern fishing, recreation and tourism industries after the USGS simulation findings were published, the BLM source said.

Public hearings on the findings will be held in Providence, R.I., in early December, when testimony will be taken from

(Continued on Page 8)

Minicomputers Not Optimized, Hit as 'Thrown Together' Units

By Eather Surden
Of the CW Staff

SAN FRANCISCO – Minicomputers are not designed from a systems point of view – they are "thrown together to solve a problem and, as a result, the system is not optimized," James Toreson of Microcomputer Systems Corp. said at the Mini/Micro Conference and Exposition here last week.

Many mainframe users are finding their way to minicomputers because business needs are information-oriented rather than computation-oriented, he said.

These users are accustomed to high reliability, low downtime and high performance because large-scale systems have these features built in, he said, but they soon learn they are sacrificing performance.

Much improvement is needed to correct this problem, he indicated.

CW at Mini/Micro

Mini users deserve a high mean time between failures, low mean time to repair and good throughput to match the initial low cost of the system, he added. "This requires a global system design that incorporates the features of the memory

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OTHER EDITORIAL OFFICES: England: Computerworld Publishing Ltd., 140-146 Camden Street, London NW1 9PI. Phone (01) 485-2248/9. Telex 264737. **W. Germany:** Computerworld, c/o Computerwoche GmbH, 8000 Munchen 40, Tristanstrasse 11, Phone 36-40-36/37. Telex 5215350. **Asia:** Computerworld, c/o Dempa Computerworld Company, Dempa Building, 1-11-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141. Phone (03) 445-6101. Telex 26792

Second-class postage paid at Boston, Mass., and additional mailing offices. Published weekly (except a single combined issue for the last week in December and the first week in January) by Computeworld, Inc., 797 Washington St., Newton, Mass. 02160. Copyright 1976 by Computerworld, Inc. All rights reserved.

50 cents a copy. $15 a year in the U.S., $23 a year for Canada and PUAS, all other foreign, $40 a year. Four weeks notice required for change of address. Please allow six weeks for new subscription service to begin.

Reproduction of material appearing in *Computerworld* is strictly forbidden without written permission. Send all requests to Walter Boyd.

Computerworld can be purchased on 35 mm microfilm in half-volumes (six-month periods) through University Microfilm, Periodical Entry Dept., 300 Zeeb Rd., Ann Arobor, Mich. 48106. Phone (313) 761-4700.

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Sees Conceptual Gap

Econometrician Questions DP Modeling

By E. Drake Lundell Jr.
Of the CW Staff

HOUSTON – Experience with large-scale computer models "has aroused some concern about the validity of complex systems," an econometrician who keynoted the 1976 National Conference of the Association for Computing Machinery (ACM) here last week said.

Despite doubts about the accuracy of such large econometric models, the push toward them – sired by the computer and damned by at least some – has become "increasingly prominent on the landscape," according to Edwin Kuh, executive director of the Computer Research Center for Economics and Management Science for the National Bureau of Economic Research, Inc.

In the past, models have tended to be small and aggregative. An advanced model of the U.S. economy in 1955 contained only twenty equations, he pointed out.

In the past five years, however, "the enabling conditions in terms of computation were advancing," moving economic models to greater detail and size "as well as more complexity," Kuh noted. "The energy and environmental crises triggered a search for complex answers to complex questions."

CW at ACM

But while the models have been increasing in size and complexity, modeling concepts are based on intellectual disciplines that predate modern computation.

The very existence of large-scale models "carries with it the aura of deeper understanding," he said, but "we ought not to flatter ourselves into the belief a computer model can rise above its intellectual foundations.

"A second real problem" with such models "is the quality of data," Kuh said.

"A model built on 'the best available data' will often in reality depend on low-grade inputs," he noted. Adding results "do not often call attention conspicuously to these flaws."

The cause of the low-quality data is "a simple fact of life" that the concerns and incentives of the data gatherers are only loosely coupled with the requirements for model building and the concerns of the model builders, he said.

Most of the data collected by the government is in response to legislative mandates and has little relation to the needs of the modelers, he emphasized.

Another problem has to do with the trustworthiness of computer software, Kuh said. "Proliferation of code has enabled us to do more things more easily and often better things as well, but sheer complexity raises the specter of not really knowing what is happening" within the systems, he explained.

"Large programs are designed by one or several individuals. Then tasks are assigned, design changes are made – not all of which are recorded. Programmers come and go, but programs remain," Kuh said.

"In these circumstances, programs which are not founded on well understood theory lack verifiability and hence trustworthiness," he contended.

While many of the more glaring errors are caught and "corrected," he said, often "large-scale programs can satisfy some internal logic and hence compute, yet in fact be computing nonsense.

"We might save the day by an intuitive understanding of the problem so absurd answers will be trapped. What concerns me is the existence of code that runs in the technical sense and churns out results that are intuitively acceptable but just plain wrong," he said.

While many econometricians, Kuh included, are excited about the opportunities presented by large computer systems, he said there is still a "large gap between what we really know about socioeconomic systems and our desire to solve the problems of the day."

SP New Owner of Datran Assets After Outbidding Western Union

By Molly Upton
Of the CW Staff

WASHINGTON, D.C. – Southern Pacific Communications Co. (SP) is the new owner of the assets of the Data Transmission Co. (Datran) network.

At the bankruptcy court auction here last week, SP outbid Western Union Telegraph Co. for the Houston to Chicago network with a bid of $4.9 million.

One of SP's first moves was to notify customers using the former Datran Kansas City to St. Louis link that portion will remain operational, according to Rex Hollis, vice-president of marketing. SP had leased this link from Datran before it went out of business.

SP had previously warned these users they might have to find other facilities if SP were unsuccessful in its bid to acquire the network, he said.

Most of these users reportedly had already switched to MCI and other carriers before the auction. SP had been operating the Kansas City to St. Louis link as part of its network on a temporary basis.

Hollis said he was not sure how soon SP could get the entire Datran network up and running since it is subject to certain procedural matters. The transfer of common carrier facilities must be approved by the Federal Communications Commission (FCC).

Stanley J. Samorajezyk, trustee in bankruptcy for Datran, said he and SP will probably make a joint application to the FCC for authorization to transfer the licenses issued by the FCC.

SP plans to carry the "best combination of voice and data" and is also considering a number of other services, Hollis said. He anticipates the network's operation will be integrated into the basic SP system.

The $4.9 million will be paid to the bankruptcy proceedings and applied first to secured creditors and then to unsecured creditors, Samorajezyk said.

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9	General Electric
10	Chrysler
11	International Tel. & Tel.
12	Standard Oil (Ind.)
13	U.S. Steel
14	Shell Oil
15	Atlantic Richfield
16	Continental Oil
17	E. I. du Pont de Nemours
18	Western Electric
19	Procter & Gamble
20	Westinghouse Electric
21	Union Carbide
22	Tenneco
23	Goodyear Tire & Rubber
24	International Harvester
25	Occidental Petroleum
28	Phillips Petroleum
27	Union Oil of California
28	Bethlehem Steel
29	Caterpillar Tractor
30	Eastman Kodak
31	Rockwell International
32	Dow Chemical
33	Kraftco
34	RCA
35	Esmark
36	Sun Oil
37	LTV
38	Beatrice Foods
39	Xerox
40	United Technologies
41	Greyhound
42	Firestone Tire & Rubber
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Charges Seventh Amendment Violated

Catamore Asks Appeals Court to Reconsider IBM Case

By Molly Upton

Of the CW Staff

BOSTON – Catamore Enterprises, Inc., awarded $11.4 million in a suit against IBM, has asked for a rehearing on a recent appeals court ruling that both voided the court's decision and called for a new trial [CW, Oct. 4].

Catamore is prepared to take its case to the U.S. Supreme Court because it believes its right to trial by jury, guaranteed by the Seventh Amendment to the Constitution, was violated, according to Thomas K. Christo, Catamore's attorney.

In its petition for a rehearing, Catamore also charged the U.S. Court of Appeals for the First Circuit incorrectly cited dates pertaining to the timeframe during which Catamore was eligible to file complaints against IBM.

In addition, the Catamore brief alleged District Court Judge Raymond Pettine's charge to the jury which brought in the original verdict constituted an "invited error" – something the appeals court also noted.

The Court of Appeals had no right to assume what the jury did or did not find in arriving at its decision to award Catamore $11.4 million and IBM $68,453, according to the brief.

"Surely, this court cannot say which version the jury had to believe. Yet that is what it has done, and this assumption of the jury's role in violation of the Seventh Amendment is a necessary prerequisite for the court's present opinion. Therein lies the error," the Catamore brief said.

Of significance in the appeals court ruling was a written Systems Engineering Services (SES) agreement, over which there was controversy as to whether it superceded a prior oral agreement for SES.

In its decision, the appeals court vacated the jury's finding on the basis that a written contract signed with IBM specified a one-year liability and that this limitation applied to a previous oral SES agreement as well. Catamore did not take action within that timeframe, the court said.

The appeals court therefore ruled the district court erred in permitting the jury "to find both that the SES agreement was valid and that IBM was liable to Catamore for having breached the two oral agreements," Catamore said.

In its decision, the appeals court also disapproved of part of Pettine's charge to the jury, which was submitted by IBM and to which IBM did not later object.

The judge told the jury that "if you find that the subject matter of the alleged oral contract was sufficiently differentiated from the subject matter of the SES agreement so that the latter was not intended as a substitute for the former, then you may consider such oral agreement in determining whether and to what extent IBM is liable to Catamore for breach of contract based on its alleged failure to furnish Catamore with a totally integrated computerized system."

'Invited Error'

Catamore categorized this as an "invited error," noting the appeals court said "the judge improperly permitted the jury to conclude that the SES agreement, if not voided by fraud, had no effect on Catamore's claims of breach of the 1968 and 1970 [oral] contracts."

The Catamore brief also argued the 1970 SES agreement may be invalid on several points, including the fact it was never accepted by IBM.

The appeals court, when investigating the facts presented to the jury, incorrectly cited such critical items as dates, according to the Catamore brief.

Under the terms of the agreement limiting liability to a year, the plaintiff is allowed one year after the "accrual of the cause of action" in which to file a complaint, Catamore said. This means one year from the point at which the plaintiff should be aware he has no other course, sources indicated.

In the Catamore case, this would extend the date for a year after Jan. 31, 1972, when IBM responded to Catamore's complaints by meeting with Catamore, according to the Catamore brief.

"Therefore, in the light of the record, it is simply not true for either of the contract causes of action that '. . . in any case it was more than a year before the filing of Catamore's first counterclaim,' " the Rhode Island user said.

Among the items Catamore cited as assumed by the appeals court in contradiction to evidence was the subject of the oral 1968 SES agreement, which IBM said was for systems design and which the court categorized as a completely designed and programmed turnkey production control system.

Catamore asked in a footnote in its brief, "How can this assumption be harmonized with the court's correct observation two pages earlier [that] '. . . we have no way of knowing either the factual assumptions the jury made or the theories of liability it found persuasive'?"

The appeals court may deny Catamore's petition; order a reargument; or deny the petition, withdraw its opinion and issue a new opinion without a hearing, sources said.

Data Base Systems Seen Spawning New CPUs

(Continued from Page 1)

they are a growing threat to personal privacy, Mueller said. A literal reading of the laws implies data bases should not be maintained at all, he added.

The "basic illogic" in that situation makes it apparent "legislators, at least, do not fully understand how processors work," he continued. "Certainly there is no technical reason" why a system of shared files such as the data base processors would entail "could not be designed without compromising privacy."

Almost as an aside, he said a citizen "probably has more privacy with electronic records than he did with the old system of hard-copy records, but there is great concern that a citizen's records will be abused" if they are on a computer. The privacy issue is further complicated by legislative requirements for full government disclosure, he noted.

"I confess I do not know" how they can be reconciled with full privacy, he said, adding "there are no signs yet" that "pressure groups or legislators are taking a fully rational view of the issue" to create legislation that will curb abuses without halting the "natural growth of the electronic age."

All growth so far has been toward enhancing the computational power of systems, he said, even though the tasks the users have been giving the systems to perform are "90%" mundane data management operations.

"In other words," he explained, "the computer industry has gone through three generations of development to perfect machines optimized for 10% of the workload."

The executive routines, operating systems and memory configurations are "carefully tailored" to meet the requirements of complex arithmetic calculations, Mueller said, and "adding a data base access function today involves a contest between the programmer and the computer.

"The computer invariably wins such a contest. The programmer must resort to convoluted paths and excessive time and storage just to enable his company to keep track of inventory," he said.

New system architecture "must allow for the fact that tomorrow's systems will be used by clerks, not programmers . . . In effect, the system should respond to the clerk just as if [the system] were another person," Mueller said.

The second major area of development must be the storage medium itself, he said. "We cannot afford to rely on electromechanical devices such as disks and magnetic tapes much longer . . .. Fortunately, we are on the verge of a breakthrough in memories," he added.

Typically the systems will have geographically dispersed elements linked by voice-grade communications lines, Mueller said. "The processing elements will undoubtedly be distributed, with intelligent terminals accessing a common data base."

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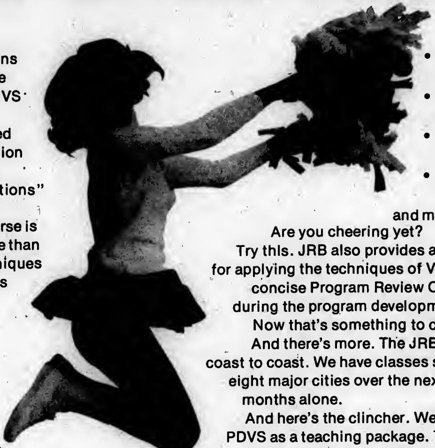

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Seven IBMers Called to Court, Never Called to Stand

(Continued from Page 1)

Rejecting Carlson's request to keep the IBM executives under subpoena until the government had a chance to review the information Barr provided in court, Edelstein released Cary and the other six men.

In addition to Cary, those called to appear in court were Hilary Faw, IBM assistant treasurer; L.I. Spector, IBM consultant; J.J. Forese, IBM's president of Office Products Division; G.A. Garry, manager of small commercial systems, General Systems Division, Rochester, Minn.; R.A. Somerby, Data Processing Division branch manager, New York; and H.B. Farr, vice-president and general counsel, IBM Europe S.A.

The subpoenas called for IBM counsel "to pull people into this city to look at thousands of documents" in the space of four days, Barr noted. The government's action was "nothing more than a case of blackmail," he said, adding he hoped the bill for witness fees and mileage would cause some difficulty in Washington when it arrived.

Barr said he and his staff had gone through more documents and depositions in the last few days than could be presented to the court in six months. He suggested IBM counsel shouldn't have to do all the government's work for it.

Stating he resented Barr's remarks "very much," Carlson said the government was only trying to get at the facts behind the documents, both of which dealt with "Project Yardstick" – an IBM effort in the late 1960s to revise its means of measuring market share.

Your Place or Mine?

NEW YORK – In response to Judge David N. Edelstein's suggestion that the lead attorneys in U.S. vs. IBM meet to stipulate, or agree upon, two disputed documents entered into evidence in support of the government's case against the corporation, the two attorneys did meet and at week's end their stipulation was in the process of being drafted.

First, however, the parties had to negotiate where they would meet.

Lead IBM counsel Thomas D. Barr invited lead government counsel Raymond Carlson to his offices; the government attornay expressed some reluctance.

Barr responded by stating his "first concession" to Carlson would be to meet in the Justice Department offices here.

In the end, the meeting was held in Barr's offices after all. The government doesn't have a conference room.

Carlson called these documents "important" to the government's contention that IBM instituted Project Yardstick at the time the Justice Department first filed the antitrust suit in 1969 because the corporation knew its earlier measurement policies and practices showed it had a monopoly share.

IBM's claim of privilege for portions of the documents confused the government's receipt of them in the proper form and illustrated "the advantage to a corporate defendant of the tool of privilege to delay a trial proceeding," Carlson said.

The facts concerning the documents were what Carlson wanted, and he stated he wasn't in a position to withdraw the subpoenas until he had that information. Barr's presentation concerning the two documents had answered many questions, he told the judge.

Having listened to both attorneys, Edelstein, who is hearing the case without a jury, suggested they go to the record to see what he tried to accomplish in ordering that members of IBM's executive suite be called into court in the first place.

Before the judge even mentioned the subpoenas, he suggested both sides meet with the intention of clearing up the problems created because the documents had no stated authors and, in one case; no addresses or date. The judge reminded the adversaries he had urged the parties to come up with a solution that "would meet the convenience of IBM and of the government."

Edelstein ordered subpoenas only as a last resort in the event the attorneys for the Justice Department and IBM could not cooperate, he noted.

"In all my experience of nearly 25 years on the bench – and even in criminal cases – I have never seen such obvious stubborness and stonewalling," Edelstein said.

"Goodwill and professional ethics require that you get together," he continued. Referring to the use of terms like "blackmail," Edelstein said the parties "don't bring credit" on their profession, themselves or their clients.

In addition, the judge accepted Barr's offer to spend one afternoon with the government to iron out the problems behind "laying a proper foundation" for the hundreds of documents both sides eventually hope to put before the judge as evidence.

Survey Shows DPers Earn Less in Finance

(Continued from Page 1)

east central sections of the country.

The national average for that position is $261.

Keypunch operators earn the least of all DP employees and are among the lowest paid of all categories of office workers, AMS found. The average weekly salary for an entry-level operator is $145 and most are paid lower than that, the survey showed.

The only office workers with average earnings lower than keypunch operators are mail clerks, entry-level general clerks and bookkeeping machine operators, according to AMS.

Systems analysts, however, are paid higher salaries than any other type of office worker included in the survey. They are also paid about $50 more on the average than programmers, the next highest paid DP employees, in all regions except the east, where they are paid approximately $30 more.

Within each DP position included in the survey, the difference in average salaries is usually between $10 and $20, except for analysts and programmers.

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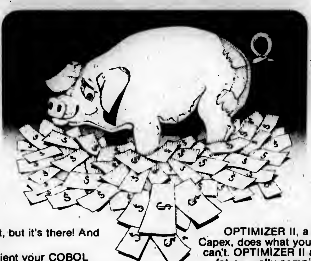

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Model Predicts 23% Chance of East Coast Oil Spill

(Continued from Page 1)

parties opposed to oil development efforts, he noted.

The IBM mainframes and California Computer Products, Inc. drum and flatbed plotters ran 32,000 hypothetical oil spill trajectories from 16 different locations on Georges Bank, an area crucial to New England's fishing, tourist and recreation industries.

However, the 15.8 million-acre undersea tract may also be crucial to energy availability in the Northeast, an area hit hard during the 1973 Arab oil embargo.

Besides the 23% chance of an oil spill, the USGS computer simulations also came up with other statistical probabilities. Among them, a BLM spokesman noted, was a 62% chance a spill would eventually reach beach or recreation areas from northern Maine to New York City if no attempt were made to clean up the surface slick and a 35% chance a spill would occur between November and April because of strong wind and ocean currents prevalent at that time of year.

In addition to these findings, he said, there is a 90% probability two spills involving 42,000 gallons or more will spring from an undersea rig or oil pipeline to the mainland within five years after exploration has begun.

The BLM spokesman indicated the 23% figure is the most accurate because advances in oil spill and drilling technologies were not taken into account by the USGS models.

"Oil companies don't want spills because the spills cost them $1,000 per day" and the public reaction to poor cleanup efforts hurts them, he said, so the development of new technology is to the oil companies' advantage.

"The study represents a larger computer effort than mental effort," USGS' Smith said.

USGS used the Monte Carlo model to predict and describe all the random behavior of winds and currents which could affect oil spills if they occur, he said.

'Crash Effort'

To get the data requested by BLM for the North Atlantic region study, a three-man USGS staff "worked overtime on a crash effort" with the dual 155s, Smith said. The mainframes talked to each other, although there was no resource sharing to any extent, according to Jim Slack, mathematician and programmer on the project.

Data was collected on the area under study from the national and state governments and private sources and input via a remote, in-house Data 100 Corp. Model 78 high-speed terminal connected to the CPUs by a 9,600 bit/sec dedicated line.

The "large batch terminal" included a console, two tape drives, a card punch/reader and a 600 line/min printer, Slack said.

After the preliminary data was processed, it was digitized in a 480- by 480-unit matrix format on "an old Bendix Datagraphix digitizer," put into the form of coordinates and input to the system, he explained.

USGS, Smith said, operated under "a tremendous constraint" in developing the computerized analyses because it promised BLM the results of the information gathering, digitizing and DP effort in four weeks.

Poor Reliability Seen In Design of Minis

(Continued from Page 1)

peripheral."

Designers must work on the operating systems on minis; many minicomputer disk systems require complete backup because of a lack of audit trail recovery capabilities, Toreson said.

Current memory peripherals available in the mini world use an "ultra-IBM 3330 with high bit density" technique, and more than 80% of the cost in a typical system is in the peripherals, he said.

To make the disk systems less costly, the controller and drive electronics have been pared down to a minimum. Users lost high-flying head heights and gained poorer filtrations resulting in lower reliability with an increase in head crashes, he said.

The systems also lack adequate diagnostic features and have "zero marginal test capability," Toreson added.

Controllers lack error correction and diagnostics. In many controller designs "you find the computer is being utilized for the control function itself, rather than a true controller," Toreson said.

The result is lower cost, but at the price of poor reliability and poor maintainability, he said.

The mini world needs reliability and maintenance built in because "field support is not as good as in the maxi world," he said.

Buses Too Numerous

With disk drives connected directly to the control unit, there are "really too many buses in the system. People are becoming more and more aware that cables cost money," Toreson said.

A lot of the electronics in the disk systems is "ill-thought-out," he added. "We need to look at it and minimize it."

Since cable is so expensive, the controller could be integrated into the drive, especially with the advent of microcomputer technology, he suggested.

A disadvantage of this is that drive expandability becomes a problem because there is no bus, he noted, but the cost of microcomputers is coming down to the point that even duplicate electronics for each drive could replace cable economically.

Another way to improve reliability would be for the controller to be incorporated into the host; this would eliminate one set of buses but allow the drive buses for expandability, Toreson explained.

In the future system, the controller itself could incorporate diagnostics to conduct self-testing and memory device marginal testing, he indicated. There is also no reason, Toreson added, why "channel concepts" such as those used between large computers couldn't apply to the smaller ones.

Changes in the media are taking place as well, Toreson said. "We are seeing what I call the hubrid disk, with not only moving heads but heads per track.

"We also see lots of fixed media, which represents a problem because operating systems are not knowledgeable about this kind of drive. You need a tape backup."

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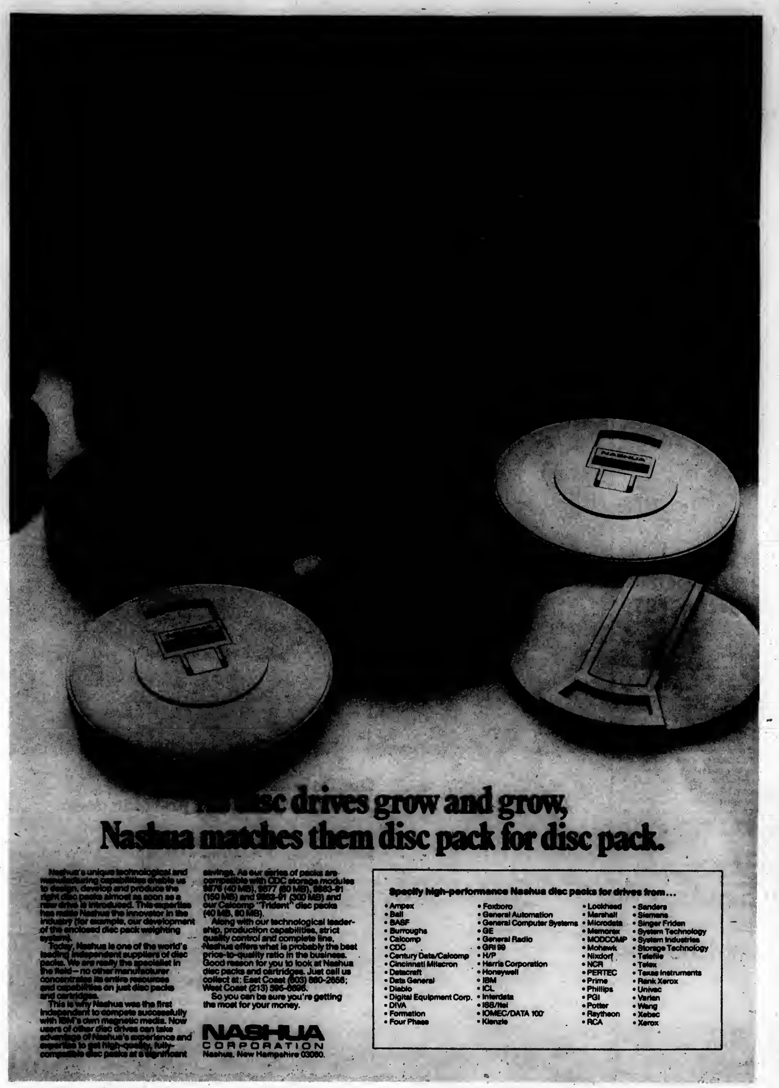

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Full Potential of POS Not Realized, Panelists Agree

By Toni Wiseman
Of the CW Staff

PHOENIX – Is there life after POS?

That is the question a panel of consultants tried to answer for attendees at the National Retail Merchants Association's annual DP and Data Communications Conference here recently.

In the early 1970s, projections were made on the number of terminals and personnel that point-of-sale (POS) installations would eliminate, but few of those projections have been met, according to Otto Becker of Arthur Andersen and Co.

"A few people have realized very, very large benefits in the personnel area, but these are really soft dollar benefits. Hard dollar benefits on the selling floor have yet to be realized," he said.

In the back office, it is a far different matter, he asserted. Sales reporting costs are way down, register balancing costs have seen major gains and there has been a positive impact on credit applications, he said.

"Another major area which was overlooked but which has been positively impacted is the billing process. Speeding up the billing process generates cash which can offset part of the investment in POS, he added.

"If you started out with a couple of hundred dollars to invest and had several options, POS would probably not be your first choice," Becker said, "but I would certainly not discourage you from considering it."

Leslie Chick, senior consultant for Touche Ross & Co., agreed, noting many firms are putting POS terminals in new stores but using them in the traditional stand-alone mode rather than on-line.

"The 'total' system is not here yet, despite what some retailers and vendors say," he added. Chick defined the total system as one which closes the retailing loop.

"The total system is one which will achieve interaction between DP and the user departments and impact the bottom line. The only total systems that exist today are a combination of manual and DP systems," he said.

Excess Technology

Joseph Lev, a principal with Cresap, McCormick and Paget, Inc., said what the retail industry has seen to date is an excess technology capacity.

"This excess has gotten us to where we are, but that is not the stimulus which will make us change. The stimulus will come from user requirements, not manufacturers' excess capabilities," he stated.

Lev also commented on the advent of information utilities in retailing or third parties. These, he said, will often be banks or service organizations with large systems.

Following the theme of the session – the current status of POS – Lev noted one chain, Fortunoff's, has deviated from the "basic" POS application.

Finding that 40% of its stores' transactions were on credit and therefore required either a phone call or credit touch-pad step to complete a sale, Fortunoff's tied its NCR 280 terminals to a CPU at its data center. From the center, data is transmitted over leased lines to an NCR computer at the Chase Manhattan Bank and then to the bank's IBM 370 for processing.

While this has not reduced the number of registers or sales personnel at the stores, it has given them an on-line credit authorization system with response time of less than one second, Lev said.

Seven Questions Urged on POS

PHOENIX – By answering seven questions, a retailer considering a point-of-sale (POS) system can cover 10% of his planning effort and possibly save a lot of money, Joseph Lev, principal at Cresap, McCormick and Paget, Inc., told attendees at the National Retail Merchants Association conference here recently.

The seven questions are:

- Has the company agreed on an objective for the POS system?
- Are present systems installed compatible with POS requirements?
- What is the most effective POS configuration for the store?
- What features are desired?
- What costs will be incurred and what are the capital requirements?
- What human resources are available to support POS development?
- What benefits will be achieved by implementing the POS system?

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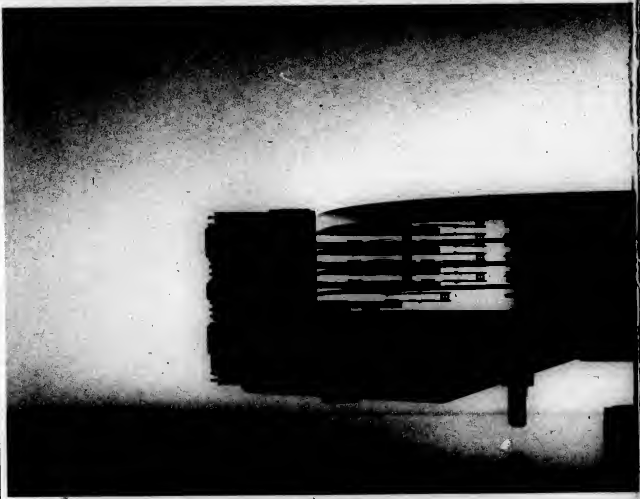

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Not Just Matter of Semantics

'S' in 'EFTS' Should Stand for 'Services': Banker

By Toni Wiseman
Of the CW Staff

PHOENIX – To be successful, EFTS must be desirable from the customer's point of view, George C. White, vice-president of the Chase Manhattan Bank, said here recently.

While the term "EFTS" was initially considered to stand for "electronic fund transfer systems," White told the National Retail Merchants Association he prefers the newer idea of "electronic fund transfer services."

" 'Systems' indicates a hardware orientation, while 'services' connotes a user focus," he explained. "It is more than just a matter of semantics – it is a matter of emphasis."

Some EFT systems such as cash dispensing machines or Touch-Tone phones can be designed from a .technical viewpoint, but many retailers and bankers have realized the focus today is on EFT services "that are attractive to both the corporation and the individual consumer, yet economical to offer," he said.

Methods Under Development

Chase, like many other banks, has efforts under way to interface with retailers' electronic cash registers. While this is an alternative method for consumers to pay for point-of-sale transactions, it must be kept in mind it is not the only type of EFT service under development, he cautioned.

The Federal Reserve system's wire network on Fed Wire, Bank Wire and the New York Clearing House Interbank Payments System (Chips), which is transferring over $1 trillion monthly, have been operational for a number of years and are electronic or EFT, he said.

By late 1977, both Bank Wire II and the Society for Worldwide Interbank Financial Telecommunlcation (Swift) networks will be operationsl, he added.

In addition, the automated clearinghouse (ACH) environment will change the way payments are made – a system that now involves 30 million checks annually, he said.

"There is not a single EFT capability, but rather a multitude of approaches and options available to our customers," White said. "In my opinion, the most economic alternatives will determine the way EFTS develops."

Option, Not Command

Consumer advocates often have taken the view that EFTS is bad for consumers, alleging consumers have given up control over paying their bills by preauthorizing payments, White noted.

"This is sheer nonsense. It is like saying that because we have helicopters, everyone has to commute to work by helicopter. Actually, helicopters simply offer another transportation alternative," he said.

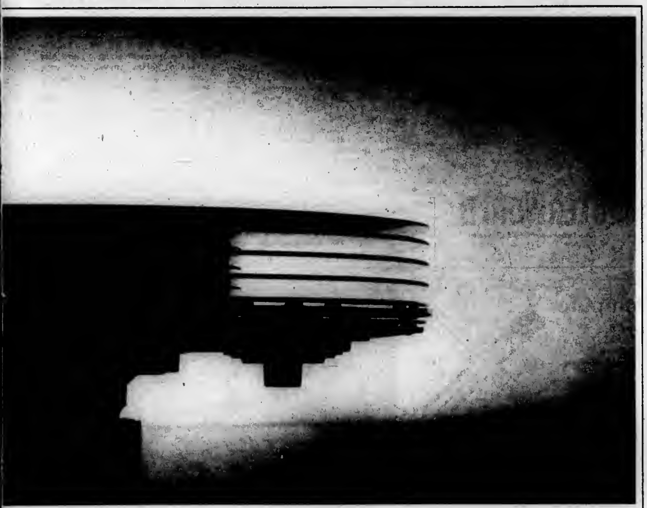
"EFT is similar in that it offers additional options for making a payment. Too often, the consumer advocates forget nothing can happen in a financial transaction unless the persons responsible for a bank account take some action," White stated

It would be much cheaper to pay small corporate dividends electronically than expend money to prepare checks and mail them, even considering the float lost by paying electronically, White said.

Direct Payment

Assuming an individual or company would like to be paid electronically, what is necessary? The customer would have great difficulty making an electronic payment today because he would not know the "banking address" to send it to – that is, the routing and transit number identifying the corporation's bank and the corporation's bank account, White said.

If corporations identified the corporate account to which they wanted their customers to send payments, the automated clearinghouse standard data formats could get both the payment data (e.g., customer's account number) and the funds transmitted to the corporations' bank accounts for subsequent daily transmission to their accounts receivable processing function, White stated.



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Calendar

Nov. 1-3, San Diego, Calif. – **1976 Position Location and Navigation Symposium, sponsored by the Institute of Electrical and Electronics Engineers.** Contact: Nelson Harnois, vice-chairman, Cubic, 9233 Balboa, San Diego, Calif. 92123.

Nov. 3-5, New York – **Eastern Regional Operations and Automation Workshop, sponsored by the American Bankers Association (ABA).** Contact: Meeting Registration Coordinator, ABA, 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

Nov. 3-5, Pasadena, Calif. – **Caltech/Jet Propulsion Laboratory Conference on Image Processing Technology, Data Sources and Software for Commercial and Sciantific Applications.** Contact: Gunther H. Redmann, 171-104, Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, Calif. 91103.

Nov. 4-5, Fresno, Calif. – **1976 California Educational Data Processing Association (Cedpa) Annual Confarence.** Contact: Ellen Landers, 1976 Cedpa show manager, 17123 Chatsworth St., Granada Hills, Calif. 91344.

Nov. 5-8, Los Angeles – **Haalth Care Information: Data Recording and Retrieval, sponsored by the University of California at Los Angeles (UCLA).** Contact: Health Sciences, UCLA Extension, P.O. Box 29902, Los Angeles, Calif. 90024.

Nov. 7-9, Andover, Mass. – **Electronic Publishing, sponsored by the Institute for Graphic Communication (IGC).** Contact: Richard D. Murray, director of conferences, IGC, 375 Commonwealth Ave., Boston, Mass. 02115.

Nov. 8-11, Coronado, Calif. – **The Third International Joint Conference on Pattern Recognition.** Contact: Pattern Recognition, P.O. Box 639, Silver Spring, Md. 20901.

Nov. 8-11, Chicago – **Info '76, the Exposition and Conference for Information Management.** Contact: Clapp & Poliak, Inc., 245 Park Ave., New York, N.Y. 10017.

Societies/ User Groups

Nov. 10-12, Alexandria, Va. – **Association of Computar Programmars and Analysts (Acpa) Sixth Annual Confarence.** Contact: Acpa-6, T-3, 7708 Hanover Parkway, Greenbelt, Md. 20770.

Nov. 16-18, Dallas – **Computer-Aided Design and Computar-Aided Manufacturing IV Conference & Exhibits, sponsored by the Society of Manufacturing Engineers (SME).** Contact: Technical Divisions, SME, 20501 Ford Road, P.O. Box 930, Dearborn, Mich. 48128.

Nov. 19, Gaithersburg, Md. – **"Trends and Applications: Computer Networks," sponsored by the National Bureau of Standards.** Contact: Computer Networks, P.O. Box 639, Silver Spring, Md. 20901.

Nov. 18-20, Costa Mesa, Calif. – **California Educational Computing Consortium (CECC) Annual Confarence.** Contact: Harper Hall, Claremont, Calif. 91711.

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Texas Developing System To Chart Antitrust Activity

AUSTIN, Texas – The State of Texas recently received a $283,000 federal grant to establish a computerized system for monitoring anticompetitive activity.

The Law Enforcement Administration Agency (LEAA) financed the grant for the system, which will act as a pilot program for other states to adapt.

It should be completely implemented within 18 months on the state Board of Control's Digital Equipment Corp. Decsystem-10, according to Michael Barron, assistant chief of the state attorney general's Antitrust Division.

The system will consist of three parts. One will monitor areas in which the Board of Control (the purchasing agency for state contracts) purchases heavily, one will serve as a litigation support system for antitrust lawsuits brought by the state and the third will act as an econometric model for determining the "but for" price of a commodity.

This is the price a commodity would cost "but for" anticompetitive actions and is used by the state to determine the amount of damages levied against a company, Barron explained.

Texas is currently in the process of hiring two new employees, an attorney/analyst and a computer programmer, to develop the system. The state hopes to have a test program running by next summer, when its case against nine steel companies that manufacture steel used for reinforcement will come to trial.

"We will use this case as a guinea pig for the three subsystems," Barron said.

Texas brought three antitrust suits to court in the last two years under Attorney General John L. Hill. In 1959-1960, however, 12 to 15 cases were tried. "We are trying to gear up to that level again," Barron said.

The state passed its antitrust law a year before the Sherman Act was passed and already had the investigative tools the Justice Department obtained last year, Barron said.

"Texas reflects the whole nation" in its tough attitude toward antitrust, he added, citing a study the Federal Trade Commission did three years ago that found anticompetitive actions cost consumers $10 billion annually.

Mini to Monitor Use of Power In Structure Built to Save Energy

MANCHESTER, N.H. – The National Bureau of Standards (NBS) will use a minicomputer-based system here to monitor energy use in what is said to be the first federal building designed especially to save energy.

Opened recently to house employees of the Veterans Administration and the departments of Defense, Treasury and Housing and Urban Development, the seven-story building will be monitored for three years.

An array of electronic sensors and gauges will monitor the building's performance at more than 700 points, according to an NBS spokeswoman.

The system will measure such things as temperature, humidity, air and water flow, solar radiation, electric power consumption, barometric pressure and indoor illumination, she said.

Data will be fed to a Johnson Controls, Inc. JC/80/45 modified to NBS specifications and recorded on magnetic tape.

It will then be read into a Univac 1108 at the NBS Laboratories in Gaithersburg, Md., to obtain weekly summaries.

The building has solar collectors on the roof integrated with more traditional heating and cooling systems as well as six other heating and cooling systems on different floors for purposes of comparison.

It is also equipped with several combinations of artificial and natural illumination to evaluate office workers' reactions to different types of lighting, NBS said.

Weather data will be tied in with equipment performance to clarify variations between predicted and measured values, NBS said.

'We Cut Energy Consumption Where We Can . . .'

Nasa to Launch CPU Into Space

CAPE CANAVERAL, Fla. – A small onboard computer will be used to detect and store gamma ray bursts when a High Energy Astronomy Observatory (HEAO-A) spacecraft is launched here next April.

Called the Microscope (short for Small Complementary Metal Oxide Semiconductor Onboard Processor for Experiments), the device was developed at the National Aeronautics and Space Administration's (Nasa) Goddard Space Flight Center.

The system, which was built with CMOS circuitry, was designed to give computing and data manipulating capability to a single satellite experiment or subsystem, Nasa said.

The system contains approximately 150 microcircuits and consumes only 200 millowatts strength of power, weighs about two pounds and is about the size of a shoe box (740 cubic centimeters), Nasa said.

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Below are some of our more immediate needs. K.B. Daly would like to hear from you at Amdahl Corporation, 1250 East Arques Avenue, Sunnyvale, California 94086. We are, of course, an equal opportunity employer m/f.

SYSTEM PROGRAMMER OPPORTUNITIES AT AMDAHL (MVT/SVS/MVS/VM)

Several immediate openings have been created by increased rate in 470V/6 shipments and Amdahl's commitments to its customers to provide unparalleled software support. All of the positions are at Amdhal headquarters on the San Francisco Peninsula, one of the most desirable places to work, live and play in the U.S.

SOFTWARE TECHNICAL SUPPORT

You will work closely with Amdahl field personnel and customers in our Field Support Center to resolve software problems encountered by Amdahl users. The job provides an opportunity to gain in-depth experience with operating systems components while actually shooting bugs. A detailed knowledge of the internals of at least one operating system, and a familiarity with operating systems utilities and SMP are musts for this job.

SOFTWARE SYSTEMS MAINTENANCE

You will develop and maintain 470V/6 model-dependent support for each of the SCPs. Incoming maintenance material is reviewed and generated for redistribution to Amdahl customers. An opportunity to evaluate new SCP function and be involved in program development. A detailed knowledge of operating systems internals and concepts is required, along with a working knowledge of operating systems utilities and SMP.

SOFTWARE QUALITY CONTROL

You will generate, apply, and review all software and materials distributed to users. The job provides an opportunity to operate systems in a hands-on environment. Successful candidates will possess a good working knowledge of operating systems components and operation. Additionally, close working familiarity with operating systems utilities, SMP, and assembler language is a must.

FIELD SOFTWARE OPPORTUNITIES AT AMDAHL

A number of newly-created positions have just opened to work with Amdahl users in the field. Immediate opportunities exist in White Plains, New York; Waukegan, Illinois; Rockford, Illinois; and on Long Island, New York.

FIELD SYSTEMS ENGINEERS

You should have a need to feel useful to Amdahl users in a mixed-vendor environment, and have a propensity for exuding the Amdahl enthusiasm. You must have a firm grasp on software systems, in-depth knowledge of large system internals (OS/MVT, VM, VS2, SVS, or MVS) and excellent diagnostic ability.

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amdahl

Editorials

Doing Watergate Proud

One of the risks of a court suit is that a business has to expose much of its internal documents to public scrutiny. And in case after case dealing with alleged antitrust violations, parties have squabbled about the documents they want to withhold for proprietary and competitive reasons.

In most cases, the courts have ruled that documents be made public unless they are of such a sensitive nature that they affect the corporate viability of a party.

In the upcoming trial of California Computer Products, Inc. (Calcomp) et al vs. IBM, however, the court has issued a gag order which does proud the disgraced tape handler of Watergate infamy.

In effect, Judge Ray McNichols has set conditions which would let either party block documents from press and public exposure without having to explain why [CW, Oct. 11].

If allowed to go unchallenged, this arbitrary decree will result in a secret trial in which the parties pass around documents in a very cozy manner.

The potential for legal abuse in such a trial is staggering. The issue at stake is much more than freedom of the press – it turns on the right of the public to have access to information on the business practices carried on in the computer industry.

It makes no difference whether IBM or the other side is proven right or wrong by the court. If neither of the parties objects to this virtual veil of secrecy, the public – and especially the users – should rightfully assume both sides have dirty linen in the closet which can't stand the light of day.

If this order is not overturned, it will cast a pall that will eventually come back to haunt our American system of jurisprudence.

Standardized Lethargy

Retailers should be praised for the caution and forethought they demonstrated in planning for the implementation of the voluntary Universal Vendor Marking (UVM) code.

Rather than rushing headlong into the age of terminal-based electronic checkouts, the retailing industry indulged itself with lengthy discussions among vendors, suppliers and consumers. It was thus able to avoid the public lambasting its less cautious – and now repentant – sister industry, the supermarkets, have had to endure.

The praise for retail marking systems is not unmitigated, however.

Even the greatest scannable price-marking standard in the world is useless if there is no widespread implementation to benefit both retailers and consumers.

The retail industry chose its standard two years ago. When are we going to see more widespread signs of its use?

Letters to the Editor

Real World – Not Leavenworth – Holds Most Fraud-Prone DPers

It was distressing to read J. Daniel Couger's attack on Federal Prison Industries' efforts to rehabilitate inmates at Leavenworth through computer programming training ["Prison, College DP Training Courses Ignore Ethics, CW, Oct. 11].

While Couger announced to his class eight years ago that "it would be only a matter of time before some inmate used his computer knowledge fraudulently," to date there has not been one documented case of such abuse involving any graduates of the Leavenworth program. In fact, the story on Page 8 of the same issue told of the exoneration of DP in a well-publicized tax fraud case involving a Leavenworth inmate.

When one sets aside the temptation to find evidence of a link between convicts and computer crime, the empirical evidence indicates the majority of criminally inclined computer specialists are found outside prison walls – perhaps even in places like Couger's classroom.

Robert V. Head

Washington, D.C.

Data Past

Five Years Ago
Oct. 27, 1971

WHITE PLAINS, N.Y. – IBM "suspended" rental and maintenance increases it had previously announced in deference to President Nixon's policy on price control. Purchase price increases for IBM 370s complied with provisions of the President's order, IBM said, and were to remain in effect.

– – –

DETROIT – Burroughs Corp. introduced the B4700 series of medium- to large-scale processing systems, a series of accounting minicomputers and five system peripherals. The operating systems offered multiprogramming and multiprocessing virtual memory and dynamic allocation of resources.

Eight Years Ago
Oct. 23, 1968

WASHINGTON, D.C. – The Federal Communications Commission (FCC) was asked by the National Retail Merchants Association and Aerospace Industries of America to throw out the Foreign Attachments tariff to the telephone network on the grounds the FCC was not responsive to the provisions of the Carterfone decision. The organizations felt there was no evidence the connection of such equipment would injure the AT&T network and asked that the tariff be struck down before its issue.

– – –

WASHINGTON, D.C. – Contract negotiations between the Federal government and major computer equipment suppliers ended in victory for the General Services Administration (GSA). Working under new powers awarded by the Brooks Bill, the GSA won an improved warranty on the performance of systems and software and set fixed limits on the power of agencies other than itself to purchase computers.

What About Problems of EFT?

"Customers of Ten Banks Now Paying Bills by Phone" [CW, Oct. 11] carried one paragraph that stated simply, "A report is printed for the merchant listing the name, address, account number and payment amount for each customer who directed payment."

In essence this sounds innocuous, but what happens to the merchant's cash capture when the banks are using a turnaround document for processing?

For the present, we only have one bank remitting these payments, but we have received erroneous account numbers, incorrect amounts due, customers with multiple accounts making a single payment and multiple payments with a single account number. All of these problems are no fault of the bank itself because it merely remits as directed.

We would be curious as well as pleased to learn how other "merchants" are meeting this new advancement – electronic funds transfer (EFT).

Mary Louise Mehmert
Utilities Systems Analyst
Miami-Dade Water and Sewer Authority
Miami, Fla.

Grosch as Traveler 'Offensive'

Herb Grosch's column in the Oct. 4 *Computerworld* was greatly offensive.

It probably matters little to most readers that the egocentric "Grand Old Man of Computers" dislikes traveling with "little children" or "just plain ordinary men and women." Perhaps he just doesn't appreciate that the airline industry has made such conveniences available to "undemanding slobs."

Or perhaps he's just been traveling too much recently to still appreciate the real world (of which he is a part – like it or not).

Perhaps the CW editorial staff should review the past few years of letters responding to Grosch's column and calculate what percentage of readers really show other than antagonism toward his comments. Personally, I don't intend to read any more of him.

Besides, what did that column have to do with DP?

William B. Gifford

Salem, Ore.

A Time for Change

What a four years it has been – for the world, for our country, for the computer trade, for me personally! The realities of world energy growth came alive, and dumped every nation on earth upside down. We elected and ejected the worst president in American history. We sent computers to Mars, and put them in microwave ovens. And I climbed off the shelf in Washington, wrote a hundred columns for *Computerworld*, and was elected head of the senior professional society in our nutty business. Amazing!

And there is more, much more, to come. Clearly there has been a pause, a time for reflection, in the last year or so. The aftermaths of Vietnam and the Middle East, the dull penances following Watergate, the peaceable wasteland around The Grim Gray Giant, my own California plateau, all seemed to say "Wait; breathe deep; take a fresh grip; there are bigger rapids downstream."

Next week the pace will begin to quicken. We will have a newly elected president, and almost certainly one committed to change. There will be a lessening of Cold War tensions abroad; Henry K. is tremendous, but how much Metternich can we stomach? There is more to do with Canada and Germany and Japan, with stubborn Russia and hidden China, than just play power games. We have much to offer: friendship, an enormous market, the greatest intellectual infrastructure in human history. Our music, our science – yes, and our horrid fast foods – leap oceans and cultural barriers.

And our greatest tool, the computer technology that you and I develop and promote, is a center of attention. Except perhaps for our surplus grain, nothing we make so attracts our friends and enemies. What opportunities it gives us – what resources! We have food, energy, land, health – and the science and the engineering and the information capabilities to utilize them; the power to plan and to replan; the flexible human talents that, given enough data, will accept and digest and benefit from change.

Almost certainly the Nixon/Ford miasma will be swept away. Almost certainly we will have a rebirth of popular confidence. Almost certainly there will be better techniques, and better technology. There are enormous barriers to pull down or clamber over: we need an energy policy, we need to rework the support of our cities, we have to balance differently the advantages and dangers of corporate bigness.

And in our own area, new Federal initiatives will be possible. Not easy, not guaranteed, but possible. We need to think more deeply about support for research, we need to get DP standards moving again, we need data communications policy, we need to eliminate stupid export controls, we need to look hard at IBM and Bell. We need people in Washington who really care about human rights, who will examine privacy and the other liberties with the eye of a Jefferson or a Sam Ervin, who will support young people, who will plant trees instead of stripping the land, who will put clever software into solar energy research instead of the B-1.

Much of that is conjectural, even after a Democratic victory. There will be plenty of resistance, plenty of disappointment, plenty of budget shortfalls, in a new administration. Georgia was not, is not, an earthly Paradise. There will still be nukeniks in ERDA, shuttle-lovers in NASA, villains in the Corps of Engineers, if we elect a dozen Carters. But there will be real hope, real possibility of change. The time is ripe to move again; we know we won't, with Stubborn Jerry. He likes things the way they are. Our whole expertise blossoms because we think things can be better.

I tend to look pretty close to home, in spite of the do-good rhetoric. I see how little comes out of the Bureau of Standards, in spite of good people and good intentions. I see how export controls continue, even after the legal props are withdrawn. I watch the dreary farce in Edelstein's courtroom, and de Butts baring his surprisingly long teeth at the FCC. We could do better, given national leadership. And I hope, in the New Year, we *will* do better. The computers are neutral; they will work for Ford or for Carter; they will work for the Pentagon or for the Disarmament Agency. The computers, and the people who operate them, can do ugly things or good things. I believe that for the next four years, they will do, not just good things, but better – better than we ever have before.

Herb Grosch

This is the final appearance of the Black Hat/White Hat column.

Readers Assess Role of DP in Overbooking Problem

The Taylor Report
By
Alan Taylor, CDP

I have received a number of letters about the overbooking problem and, as might be expected, they included various suggestions on how to handle the matter.

But, in other ways, they have raised another point – where DP fits into such matters. This really does come first because, depending on where you feel DP fits in, particular solutions can be found that are either inadequate to match up or too overreaching in assuming every programmer carries the chairman-of-the-board baton with his coding paper.

Two such letters follow. In the first, I have noted the particular positions discussed and would like you to refer to the accompanying questionnaires and note whether you agree with them.

Dear Alan:

Of course, the problem is the no-shows [1]. The current system is grossly unfair since the honest traveler bears the risk and penalty for the dishonest one [2] who plays games.

The traveler with a confirmed booking bears the risk of being bumped because the system has been set up to handle the problem of the no-shows [3].

Why should the confirmed "show" traveler have to bear the risk of loss the airlines suffer due to no-shows? I think it is grossly unfair.

Of course, this is not a computer problem or an optimization problem [4]. While it may be worthwhile to take the policy as given and try to find an optimal solution within these constraints, I think such an approach is characteristically myopic for the computer professional [5]. A computer professional should apply enough thinking power to the problem to see it in its full perspective, then push for more appropriate solutions.

What is the solution to overbooking? Obviously, the no-shows should bear the risk for their petty dishonesty [2,6]. A seat will not be confirmed without a paid ticket.

What theater operator [7] would think of selling a ticket for a performance on the condition you only have to pay for it if you use it?

I would suggest a graduated penalty, based on the number of hours before flight time that the airline is notified a paid confirmed reservation will not be used; no penalty for cancellation 24 or more hours before the flight; 20% loss of fare down to eight-hour advance notice; 50% loss of fare down to four-hour advance notice; 75% loss of fare down to two-hour advance notice; and loss of full fare for no advance notice or notice within two hours of flight time.

Standbys could still take a no-show seat at the last minute, pay a reduced fare with a portion of those funds reducing (not eliminating) the penalty to the no-show.

Obviously, these rates are only suggestive. With such s scheme, the no-shows, who constitute the nub of the problem for those who are bumped, bear the risk [6] of their failure to give timely notice to the airline of nonuse of a paid seat.

In this way, those who play the game of multiple bookings or of changing their plans at the last minute can still play the game – but now they know the cost of the game.

Gordon C. Everest

Well, there is one position and, in many ways, it is being echoed. For instance, here is another letter which seems to be saying the same things in much the same order.

Dear Alan:

I have been following with considerable interest your discussions about the overbooking problem. There is one basic ingredient missing which I believe is the cornerstone of all successful systems work – total design by a team composed of operating and systems people.

As I understand it, the real problem is no-shows. Increased sophistication of computer simulations, per se, isn't going to solve the problem.

Instead of working with effects (overbooking) to solve a cause (no-shows) we should be looking for causes that will reduce or eliminate undesirable effects (no-shows).

I like to think that in the business world we are governed by economic forces. Therefore, to carry our cause and effect analysis backward, we must ask what economic forces are needed to reduce the incidence of no-shows.

One suggestion is that tickets must be constructively paid for *n* days in advance with a cancellation charge of *d* dollars if the cancellation is in the n-day period and possibly a larger charge if the cancellation is by default.

You can only get total solutions when you take a total systems approach using all the principles involved in operating the system.

Chuck Powell

Well, there you have it. Now the question is: Are the positions taken up by Everest and Powell in agreement with your opinion of data processing? If not, what are the differences between them?

Where Are the Overbooking Problems?

The following points are referenced in the Everest letter. In each case you are asked to either agree or disagree by circling Yes or No. Please include your comments in an accompanying letter.

(1) Is the overbooking problem no-shows? Yes No

(2) Is a no-show dishonest? Yes No

(3) Has the current booking system been set up to handle the problem of no-shows? Yes No

(4) Is overbooking a computer optimization problem? Yes No

(5) Is looking for an optimal solution within constraints characteristically myopic? Yes No

(6) Should the no-show bear the risks? Yes No

(7) Is the theater operator analogy valid for airline overbooking? Yes No

Name__________ Position __________

Address__________

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After completion, please return to Alan Taylor, c/o *Computerworld*, 797 Washington St., Newton, Mass. 02160.

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Reader Commentary

Professionalism Always Good Ploy for DP 'Terrorist'

By Joseph T. Rigo

Special to Computerworld

Arnold took a long swallow from his third martini.

"I'm going to destroy them," he snarled.

We were at the bar of the Hilton Inn in Chattanooga, Tenn. We had both been speakers at a regional conference of the Association for Computing Machinery.

I was there to peddle my ideas about system documentation. Arnold's mission was to pave the way for his employers to take over the U.S. computer market.

"I undermine them," Arnold said. "I make them lose confidence in themselves and their friends."

Most people think Arnold works for a nonprofit research foundation. Actually, he is an international terrorist. He started out as an ordinary bomb thrower, but he was smart and he worked his way up.

"Professionalism is always good," he said. "I tell them they're surrounded by incompetent jerks who chew food with their mouths open.

"Then I sell them a certificate. It's gorgeous. It says 'Competent Digital Professional' in great big letters. Here, you gotta see one . . ."

Arnold reached for his briefcase, but lost his balance. His stool slipped and he dropped to the floor. A band was playing across the room and no one noticed us.

"Have another drink," I said.

Arnold lives in a New York suburb. He likes to get away from the area every once in a while, but he can't handle it. Meeting decent people destroys him.

"It's been bad ever since my book came out," he said. "I've been traveling more and talking more."

Arnold is the author of *Your Systems People Are Robbing You Blind.* It's a big seller in business management circles.

"I got a bundle of money from the National Grants Foundation," Arnold said. "Then I spent a couple of years clipping newspapers and talking to people. And then I put the book out."

The book attempts to convince corporate management and the public that programmers and systems analysts are a bunch of thieves.

Arnold's employers are developing a new line of sand-powered, oil-cooled mainframes. The computers aren't very accurate, but they are easy to use. They are scheduled to be introduced in North America within three years.

"You don't have much time left," I said.

"It's enough," he answered. "My book really has them shaken up. They're putting buzzers on the doors, padlocks on the printers and poison spiders in the tape library. How long can people work with that going on?"

Arnold waved at a young man who walked in and was joining a group at a table.

"Take that guy," he said. "We talked after the meeting today. He's a good guy, and he likes the people he's working with, but he's only human."

Arnold outlined his strategy.

"First I ask how he feels about the government's proposed standards for memory bus speeds in the high-density area. He couldn't care less, of course, but he worries about being a good citizen, so I've got him on the defensive.

"Then I ask if he read the editorial in this month's *Gigomation* about privacy, and he has to admit he failed again.

"And finally I hit him with the clincher. I accuse him of not communicating adequately with top management. He's still on his feet after that one, but his days are numbered."

Arnold's speech was becoming slurred. I took another swallow from my glass of orange juice and looked across the room. There were quite a few people from the conference, and they seemed to be enjoying themselves.

The band began to play "Dixie." There was a yell from the crowd, and everyone started waving handkerchiefs or table napkins.

"I don't understand why these people put up with me," Arnold said. "There are so many remarkable people in the computer business. Look at how much they've done in so few years."

He paused a minute and looked at the people.

"Sometimes, I think they're just not paying attention," he said.

"Have another drink," I said.

Rigo is president of Sysdoc, Inc. in New York City.

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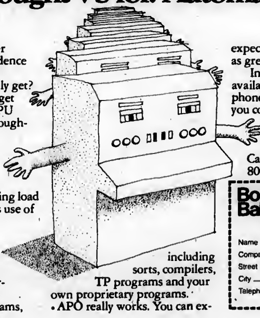

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SOFTWARE&SERVICES

Survey Finds High Hardware Costs

Users Wish They Had Taken More Time Picking DBMS

By Don Leavitt
Of the CW Staff

DALLAS – If DP managers already using data base management systems (DBMS) were to examine such systems again, they would "very definitely" devote more time and attention to determining the potential impact of the DBMS on their operating environment, according to Marketing & Sales Support, Inc. (MSSI), a local research firm.

They would also examine in more detail the hardware resources that would be "consumed" by the DBMS, MSSI said after conducting a recent survey of more than 350 organizations.

Availability of training and education for the DBMS they might select would be another key area the managers would examine in more detail, make better plans for and actively pursue before moving into a data base environment, MSSI found.

Though the results of MSSI's survey were generally positive, they emphasized the managers' hard-learned lesson of taking a cautious approach to any operation as fundamental as acquiring a DBMS.

The survey found a "high correlation" between real satisfaction with whatever DBMS was finally installed and the preparation of a formal request for proposal (RFP) from various vendors and the running of a benchmark for the proposed systems.

Presumably the formality of an RFP would force the potential user into clarifying exactly what the DBMS was expected to do for the using organization, while the benchmark would clarify how well the proposed system would actually perform.

Typically, when benchmarks were run before installation, the chosen system performed as well in production mode as the test runs indicated it would, MSSI said.

Once installed, DBMS generally have improved the quality of the users' application system design and, at the same time, reduced the system design, programming and implementation time frames, the survey found.

Some Problems Experienced.

But there were some problems, too. Anticipated improvements in throughput, for example, "were not generally being experienced," according to MSSI.

In addition, planned reductions in the size of the users' data files did not take place as often as expected, the survey found. Data redundancy had been reduced as anticipated, the researchers said, but "the recovered storage space appears to be consumed by the DBMS overhead."

Bearing down on that point, the report said respondents generally "saw requirements for substantial improvements with respect to the operating characteristics" of the systems.

Focusing on how well programmers relate to DBMS, MSSI said programming of new applications as well as the maintenance of existing ones "appears to be improved with the utilization of DBMS.

"Teleprocessing systems were implemented in larger numbers within shorter time frames where data base environments exist," the researchers added, but MSSI did not elaborate on that piece of information, leaving it to the reader to wonder what causes the growth in on-line work in a DBMS setting. Is teleprocessing system development easier because of the data communications software that often accompanies today's DBMS?

Or have the organizations that have gone to DBMS simply reached the point in their DP growth at which teleprocessing applications seem necessary, regardless of how hard the implementation might be?

Lending some credence to the latter explanation, MSSI noted that with the implementation of a DBMS the users "generally have brought up predominantly new applications with only a very limited number of existing ones being converted."

In fact, it was generally one or more new applications that led managers to even consider a DBMS in the first place, the report said.

With the installation of a DBMS, particularly in the larger data centers, the development of a data base administration staff "was found to be required."

When this function is present and properly chartered with responsibility for coordination of all data base management activities, "there is a much higher level of satisfaction with and performance of the DBMS," the report continued.

On the average, approximately 25% to 30% of the surveyed installations' applications are being processed under DBMS. And, in most cases, one of each installation's most significant, larger applications was being processed on-line (under DBMS) with more on-line applications planned, MSSI said.

The survey indicated a move to more elaborate operating system environments as DBMS takes hold in an organization. While it was directed at all types of IBM DOS environments, the survey said "IBM's IMS and other sophisticated DBMS such as [MRI's] System 2000 were found . . . in increasing numbers in OS and OS/VS environments."

IBM's DL/1 and Cincom Systems' Total are the predominant DBMS installed within DOS and DOS/VS environments, the researchers added.

MSSI is at Suite 335, 7540 LBJ Freeway, Dallas, Texas 75251.

Divided Staff Conquering Workload

By Dr. Robert J. Bradley
Special to Computerworld

JEFFERSON CITY, Mo. – The Information Systems Division of the Missouri State Highway Patrol is currently developing and implementing comprehensive computer data base systems in three major functional areas: law enforcement, highway safety and public safety administration. These systems are all operated on a statewide computer network serviced by two IBM 370/155s and Comten 3650 communications controllers.

Since the initial development of a telecommunications network by the patrol in 1969, the level of services provided under this system has expanded dramatically. New projects have been undertaken with the purpose of providing for the evolving functional centralization of selected criminal justice agency services for the State of Missouri. During the period of 1972-1976, the annual computer system workload has increased as shown in Figure 1.

	1972	1973	1974	1975	1976 (Through August)
Transactions (Thousands)	4,608	13,236	21,712	23,906	18,745
Characters (Millions)	1,344	3,718	5,743	7,726	7,229
Jobs Processed	29,443	51,570	67,339	113,941	90,453

Figure 1

This work load increase can be attributed to the following:

- Maintaining statewide files on stolen vehicles, wanted persons, stolen property, highway road conditions, state weather conditions and message switching capabilities between terminal users in the state.
- Entry and retrieval of records from the National Crime Information Center in Washington, D.C., for state and local agencies.
- Message switching and retrieval of driver and motor vehicle records from the NLETS System (Phoenix) and the Missouri Department of Revenue System (driver and motor vehicle records).
- Collection and analysis of traffic accident reports from over 400 local police agencies.
- Collection processing, storage and retrieval of records for over 14 other state criminal justice agencies.

It very quickly became apparent that the software and applications systems developed in 1969 simply could not handle the workload of the '70s. After extensive and careful study, the Missouri Highway Patrol selected Cincom Systems' Total and Environ/1 as its data base management system and telecommunications monitor and they were installed in late 1973.

Even with the normal learning curve associated with any new technology and the orientation to new software capabilities, the patrol has been able to implement 13 major application systems by moving into the data base/data communications environment.

The new Environ/1 and Total systems manage a network of 118 data base files. Daily terminal transactions to inquire and update these files average approximately 40,000 over a 12-hour period distributed as shown in Figure 2. Average internal processing time is approximately 1 second per transaction.

Departmental Reorganization

However, the patrol found with the advent of data base/data communications technology, a new departmental organizational structure would be necessary if application systems were to be developed and implemented on a timely basis. For that reason a data base section was created to manage all system files and data base related activity in addition to the traditional systems, programming and operations functions.

To achieve this goal, the data base section was divided into two functional groups: the data base design unit and the data base implementation unit.

The design unit is primarily concerned with converting systems specifications developed by systems analysts into technical data base design specifications. To achieve this objective, three functional activities were assigned to this unit:

- First, the system review process is

(Continued on Page 19)

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Ambitious Ambiguities

Outside Pressures Seen Impacting Selection of DBMS

By Don Leavitt
Of the CW Staff

MANCHESTER, England – In practice, the final decision to install a data base management system (DBMS) may be determined by factors which have little relevance to a reasoned approach, according to a senior consultant with the National Computing Centre here.

Writing in the September issue of the English magazine *Data Processing*, Brian Davis noted the DP manager making the DBMS decision has to face many pressures, including "a personal pressure to provide a panacea" for his organization..

Other distractions may be pressure from subordinates wanting to work with the latest techniques, pressure from higher up in the organization for management information and pressure from the parent company to "toe the party line," Davis added.

Although almost a postscript to an article in which Davis posed a list of questions and comments meant to provide a starting point when considering DBMS, these "outside" pressures often are the real reasons for an organization getting a DBMS, he said in a recent interview.

In light of that thought, the first of his questions takes on added significance: "What are the real reasons for proposing a data base system?" Listing some possible reasons, he warned "if there is no definite [reason] then the organization must make a conscious decision to invest" in the belief a DBMS will provide "the ultimate answer to the company's future DP problems."

Have the alternatives to adopting a data base approach really been explored? he asked next. And then, "What similar organizations have been successful in doing what is proposed and also what failures have there been, and for what reasons?"

Many organizations that are successful in the use of DBMS paid a great deal of attention to the experiences of others, Davis noted.

Beyond what happened at other installations, he urged users to study the effect the proposed system might have on the organization and its management. The level at which the implementation of a DBMS needs to be controlled is directly related to the degree of system integration planned, he added.

Installing a DBMS may also require other software, Davis indicated as he discussed the possibility of a data dictionary.

Jumping back to concern for changes in the organization, he said the next question might be: "Will we need to establish a data base administrator?" The importance of the role of the DBA – and "he should be given the necessary authority" – is directly proportional to the degree of integration planned, Davis commented.

Another staffing concern is whether the necessary expertise exists within the company.

How will the users be affected by the implementation process? Davis' next worry, followed by a compound query that seems to cover many "housekeeping" details in a DBMS study: "How will reliability, integrity and privacy be maintained? What extra equipment will be necessary? What will be the availability and practicality of backup facilities? How will integrity and confidentiality be maintained?"

Texan 'Has Data Base, Will Travel'

DALLAS – If you ask Cbuck Eisemann a question, the quiet Texan will give you a straightforward, brief answer. However, if you ask him for an opinion, you may get more than you bargained for. He packs a massive data base of opinions in his briefcase.

Eisemann, president of Dallas-Based International Resources & Applications, travels about the country performing employee attitude surveys for large corporations. His data base, a compilation of tens of thousands of previously expressed opinions, resides on the computers of Infonet, Computer Sciences Corp.'s international remote computing network. He taps into the data base to compare customer responses with the historical data – his "norm" – using a Texas Instruments 745 briefcase terminal.

"The purpose of the survey," explained Eisemann, "is to pinpoint favorable areas and problem areas within a company. The symptom, for example, may be high turnover, but the real problem may be a lack of recognition for a job well done. Now that's easy to fix, but very tough to detect without the survey."

Eisemann begins a typical survey by having the target group fill out an anonymous questionnaire containing 20 core questions, such as "I get recognition when I do good work – agree, no opinion, disagree." The core questions are based on M. Scott Myers' motivation maintenance theory. Up to 20 additional custom questions may be added to the questionnaire to zero in on clients' specific concerns.

He then enters the responses into an Infonet data file and uses several Fortran programs to produce instant comparison resports dtailing deviations from the norm. "A significant deviation in one of the categories usually isolates the problem," said Eisemann. "We then work with both management and labor to remedy the situation."

In a recent example, Eisemann presented management of a large mid-western firm with his survey findings broken down by department. Department managers and employees used the data to develop a safer working environment and cut back on wasted material, resulting in savings of more than $75,000 per year.

If the survey is relatively small, such as a specific group within a company, Eisemann collects the data in the morning and processes it during lunch. By the time the group returns from lunch, the reports are ready.

In the case of large surveys, Eisemann takes the raw data back to his office here and keys the raw data into Infonet for deferred execution. Once the responses are processed, he frequently uses CSC's graphic display software, Encore, to convert the tabular findings into charts.

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Division of Duties Eases Work for DBMS Operations

(Continued from Page 17)

aimed at providing a more complete background of needs which may well influence technical design of the data base and associated access strategies. Most often these enhancements include additional detailed system procedures or workflow techniques, data base standards, data set modeling and establishment of educational requirements for user representatives.

- Secondly, final specifications of the data base are prepared. These specifications include functional data base design; data base structure and content; data base rules, limits and restrictions; and security consideration/features. Architectural activities occur in cycles of access path modeling and testing. This facilitates early modification of the data base network to ensure all functional and relational requirements are satisfied.
- Lastly, data base access paths and networks are tested for relationship efficiency with application code and test records.

The data base implementation unit is charged with the data base systems support and control functions.

- Data base systems support follows the design specifications in the creation of a physical data base. Associated activities include a logical data base definition (documentation of the physical data base) which is distributed to the appropriate system users. If needed, various application subschema definitions are also generated. In addition, test data bases are established and technical support provided to DP personnel.
- The data base systems control function addresses the continual monitoring and management of production data bases. Activities include all the mechanics of data base maintenance, i.e., backup, recovery, restart, file creation, loading/unloading and data base fine tuning.

Three Years' Work

Initially, the establishment of a separate data base section, with its own manager, was fundamental to the patrol's successful entry into the data base/data communications environment. The new systems (Figure 2) were designed, developed and implemented as on-line real-time systems in approximately three years with an average staff of six analysts and 13 programmers.

During this time period, the staff prepared 352,439 lines of code comprising 1,749 programs to process the 13 systems listed above.

With this massive development effort completed, new problems arose in regard to support and maintenance of the 118 files maintained as an on-line data base. To better coordinate these support requirements, the data base unit was then separated in the following manner:

- The data base implementation unit was transferred into a new technical support section which is responsible for the computer network, the teleprocessing monitor and the production data files.
- The data base design unit was merged into the systems and programming section which is responsible for the analysis, design and development of all application software. Lead systems analysts and programmers were given the responsibility and the duties of data base design as a part of their other design tasks. When an initial architecture of a system is prepared, the technical support section is consulted to review the technical considerations of networking, transaction processing and data base performance.

In summary, the initial organization of a separate data base unit was crucial to rapidly learn how to implement systems utilizing the Environ/1 and Total software products. As the unit became proficient and as new systems were placed in production, new needs developed which required a reorganization of staff capabilities.

At this time, the new development of on-line real-time systems has become a relatively standard task whereas the support and maintenance of multiple integrated systems becomes a more demanding task requiring a major concentration of staff expertise in the technical support section.

Bradley is director of the Division of Information Systems with the Missouri State Highway Patrol.

Systems	Files	Records	Average Daily Transactions
Attorney General Case Docketing	7	97,949	945
Budget Accounting	14	22,075	415
Commercial Motor Vehicle Carriers	8	130,408	1,192
Criminal History	7	481,008	2,005
Documentation Control	9	22,546	19
Drug Analysis	5	926	2
Juvenile Offender Case Records	5	21,248	286
Motor Vehicle Inspection	12	125,168	583
Network Security	8	644	166
Patrol Arrest Reporting	7	588,037	11,772
Probation/Parole Case Records	8	344,991	5,596
State Prison Population	18	206,745	4,113
Statewide Traffic Accident Records	10	1,359,855	12,056
	118	3,401,600	39,150

Figure 2

Monographs Published

WELLESLEY, Mass. – Listed as part of the Data Base Monograph series, *Data Base and Computer Systems Security* by John M. Carroll and *An Assessment of Current Data Base Trends* by Ronald G. Ross cost $15 each from Q.E.D. Information Sciences, Inc., P.O. Box 181, Wellesley, Mass. 02181.

RAMIS REPORT #3

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DBMS Used as Base of Laboratory's Security System

By R.O. Tyler

Special to Computerworld

LOS ALAMOS, N.M. – The Los Alamos Scientific Laboratory here is operated by the University of California under contract with the U.S. Energy Research and Development Administration. Because of the nature of the laboratory's work, a high level of security has to be maintained.

One aspect of this security system controls and monitors access to the laboratory and its various sites by the several thousand employees and visitors who require admittance to perform their duties. As a by-product of the security measures, massive amounts of information relating to clearances, security education, badges and visits are compiled.

This information has to be stored in some accessible manner for several years. Early in 1975, a security operation designed around System 2000, the data base management system (DBMS) from MRI Systems Corp., was implemented to contain this data.

The primary goals of the security system were much the same as the goals for any modern DP information system: data integrity, reliability, timeliness of information, rapid retrieval of information from the data base and elimination of as much of the maintenance-programmer role as possible.

Making this even more of a normal DP application, there was a crunch on time, since implementation by the first of 1975 was highly desirable. Also, available manpower resources did not allow a massive programming effort to be used for this implementation.

What was unusual about the system was that all of the original goals were met with the available resources, including the implementation date. The system has been in operation for the past 22 months and it is doing the job for which it was designed.

Requirements Documented

The initial system analysis work required approximately one man-month. At the end of this time, the users' requirements had been documented.

Once this stage was completed, a test data base description was created and the test description was loaded with data. This phase of the project required two man-weeks, and no programs were required for the work – just the System 2000 natural language and a remote terminal. Once the test design was ready, a demonstration was given the requester.

At the end of the demonstration, limited training in simple retrieval language was given and the data base was released for evaluation. This phase took a day or two.

After a week of evaluation, the requester returned with several criticisms of the data base description. Appropriate modifications were made and the data base was then returned to the requester for further evaluation.

This evaluation and modification phase was repeated three or four times over a period of a month. The end result was a workable data base description which had been fully tested by the user.

In addition, there existed the full potential of the DBMS' natural language retrieval and update commands, its report writer feature and its backup system. In other words, all that remained was to load data into the data base and provide a method for batch updating.

One man-month was expended in the design, writing and testing of a Cobol edit/update program and two man-months were required for the design, writing and testing of a Cobol-PL/I program to perform the initial loading of information into the data base. After these projects were completed, a full system existed with some four and one-half man-months being expended.

Once the bare-bones system was implemented, several retrieval Cobol-PL/I programs were added to the system. These were master listing-type reports for special purposes.

In addition, several modifications were made to the data base description. These were to correct design errors and to meet new requirements.

To date, the DBMS has proven flexible enough to allow these additions and modifications without causing major upheavals for either the data base users or the DP department.

The security system was one of the laboratory's first data base efforts and there have been mistakes, as with any first attempt, but the DBMS itself has performed very well.

The users have been able to comprehend the retrieval language with no great problems. It is now possible to retrieve quickly such information as a list of all persons visiting the laboratory within a specific time span, those visiting for a specific reason, those issued a specific type of badge and those employed by a specific employer.

This type of information is needed almost on a daily basis, but prior to the implementation of the system it was nearly impossible to obtain. By allowing several terminals to be attached to the data base at various key locations in the laboratory, much of the information service aspect of the operation has been eliminated.

Limited on-line update, via terminal, in the DBMS' language has given the data base owner added flexibility in keeping the data base current and correct.

Audits of the system have proven that data reliability has been improved considerably. In addition, these audits can be performed without bringing the user's environment to a standstill. No more problems have been encountered with the batch updates to this system than similar updates in a more conventional system.

While the DBMS has some limitations, most can be circumvented without taking extreme measures.

Basically, in the final evaluation, the system works, the user is happy and the standards and rules of the DP production environment have not had to be totally scrapped.

Tyler is a senior programmer/analyst in the Administrative ADP Department at Los Alamos Scientific Laboratory.

Correction

The equation to determine the cost per data item cited by Morgan and Burke in "'Base' Approach Wrong for Some Data" (see Page S/9) should read:

$$\text{Md} = \frac{\text{Manpower Costs} + \text{Computer Costs}}{\text{Data Items}}$$

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New York Hospital Picks DBMS

Cost of Systems People, Ills of Old System Cured

BRONX, N.Y. – The high cost of systems personnel was a major issue in the selection of a data base management system (DBMS) by a major hospital here.

"After checking with a number of existing users, we discovered that with IMS we would need a minimum of two systems programmers. With IDMS, on the other hand, I'm able to perform all systems support functions myself using only 10% of my time as DBA." That's how William A. Walker, data base administrator for Montefiore Hospital, summarized the selection of the Integrated Database Management System (IDMS) from Cullinane Corp.

When the decision was made to replace an outmoded, ineffective information system with a data base management facility, the hospital's DP project team determined implementation must occur slowly, "from the outside in." Adopting this gradual approach, the planners decided the hospital's Medical Group was an ideal place to begin the conversion to DBMS.

The Medical Group is an outpatient, ambulatory care facility staffed by private physicians and specialists. Occupying its own building, the group has an autonomous staff of registrars and accounting personnel. Thus, it forms a peripheral and somewhat segregated data collection area.

With a patient clientele numbering almost 40,000, this outpatient facility was chosen as the focal point of a conversion process that will gradually move inward toward the hospital's accounting and general ledger system.

The DP project team began its feasibility study by tracing the hospital's overall data flow and projecting a gross timetable (by quarters) for implementation of an information system that would operate from a single, hospitalwide data base.

Previous Process

Under the old registration system, according to Walker, registrars completed all forms based upon information supplied by the patient at the time of admission. The forms were keypunched and output to tape each week to update the registration master file. Then printouts of the updated information were generated and returned to the registrars for a validity check.

Bills were generated from the master file and sent to the appropriate party.

Finally, patient information forms, containing data repeated from the registration forms, were prepared manually and sent through the same keypunch-tape-print cycle.

Timely. data access was impossible, Walker noted. Even routine questions such as "Has this patient been treated here before?" Or "What is his insurance company?" necessitated numerous phone calls and time-consuming cross-checks throughout various hospital departments.

Report generation was slow, he added. Since the batch-oriented card-to-tape system generated bills only once a month, the hospital's cash flow deteriorated. Weekly billing was needed as well as the ability to interface directly with Medicare and Medicaid agencies. The old system was simply incapable of providing timely output processing, Walker said.

Error handling was inefficient and inaccurate or missing registration data would often be discovered only during the manual verification cycle or the billing process.

There was also a high degree of data redundancy. Medical Group patients often were admitted later as inpatients, and a complete new set of registration data, much of it repetitive, would be collected for the patient.

All of this meant Montefiore's DP department spent most of its time putting out users' fires and clearing up confusions resulting from each department's attempt to control its own data. Also, a closely watched, limited budget posed serious hindrances to change.

Team Objectives

The DP project team determined that any system implemented must eliminate data redundancy as far as possible by providing immediate access to all registration and accounting data for an individual patient. The system should also provide instantaneous data retrieval and update capabilities from within the user departments and generate timely reports for both users and DP personnel.

After a two-year planning period, the project team decided an on-line data base management system would best meet the hospital's overall information needs. During the selection process, Walker and the project members examined all of the major data base systems. Montefiore chose IDMS because, as Walker phrased it, "it fit most closely the hospital's data base design criteria."

Support, however, was the real deciding factor in the selection. As part of the decision-making process, Walker telephoned several existing IDMS users. According to his findings, "Cullinane's staff was known to respond quickly whenever problems arose."

Montefiore installed IDMS in April 1975 and the first production program, the Medical Group Patient Registration application, went live in November 1975.

Under the new system, all registration data is entered through 10 IBM 3270s tied to the hospital's 370/145. All transactions are entered via CICS, which performs all message-switching tasks and channels data base requests to IDMS.

Walker traced a typical transaction through the system:

- The user signs on and is presented with a "menu" with four options: new patient registration, data retrieval, registration update or "face sheet" output.
- The system projects onto the CRT a facsimile of a registration form that is either blank, partially complete or totally complete, depending on the function chosen.
- The patient's name and address, Social Security number, Medical Group accounting number, date of birth, responsible party, emergency contact and insurance information is keyed in as need-

(Continued on Page 23)

Montgomery Ward Wraps up Audit Package with MARK IV®

By Don Trinite, EDP Audit Manager
Montgomery Ward & Company
Chicago, Illinois

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"We handle payroll system audits the same way. When we receive a request, we submit the job with a cataloged request as a remote test. The output comes to us, and we relay it to the field.

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Small Test Bed Eases Design of IMS Applications

By Gary M. Gumbiner

Special to Computerworld

CHICAGO – When designing a data base system, it is often advantageous to be able to create small test data bases for training and application program testing purposes. However, test data bases must be created quickly, and when the inevitable structural changes occur, the test data bases must be flexible enough to allow for their implementation.

Our experiences at the Chicago Transit Authority in creating small IMS/VS test data bases for the Bus Utilization System (BUS) project has led to the following approach.

Two basic steps are required to generate initial test data bases:

1) For each data base to be loaded an OS file of variable length records must be generated. Each record represents a segment to be inserted into the test data bases. The records must occur in hierarchical sequence required by the corresponding data base. The records contain the segment name, followed by the data portion of the segment to be loaded.

2) The following tasks must be performed:

- Allocate the required Vsam clusters. (Assume test data bases will use the Virtual Storage Access Method.)
- Invoke the Utility Control Facility (UCF) to load the data bases, resolve any logical relations and generate secondary indices.
- Invoke e program to list the data bases just loaded (e.g., DFSDDLTO).
- Execute the IDCAMS PRINT command to provide a dump of the data bases to verify that pointers are allocated and filled as intended.

The first step determines the actual content of the data bases. Any standard OS test file generator can be used. The transit authority selected IBM's IEBDG as the most readily available.

A great deal of care and time is required to lay out the test files properly. The following guidelines are recommended:

- Very few records should occur in each data base.
- Logical relationships must all resolve properly.
- Most common situations should occur, but it is not necessary to put in all conditions. It is easier to create simple test data bases, then alter them with a user program to reflect any unusual conditions.

Any mechanism chosen to generate the OS files must allow for easy addition of fields to a segment, alteration of field lengths and addition of segments.

The following general points should be noted about the second step:

- The IDCAMS step should delete old Vsam clusters and then define new Vsam clusters.
- Work files used by UCF sometimes must be referenced by more than one DDNAME. In that case, the files must be allocated before the UCF step (e.g., with IEFBR14).
- The common field values required on logical relationships must be checked carefully. If they are invalid (e.g., no logical parent exists for a logical child), UCF will list the invalid conditions as it detects them.

Assuming one master set of data bases has been created, test data bases for users can easily be created by invoking IDCAMS to deallocate/allocate all required Vsam clusters and use the REPRO command to create copies of the test data bases.

It should be noted that the above IDCAMS step should be executed as a separate job and not as part of the job which ectually creates the test data bases.

Also, it is assumed all required DBDs and PSBs have been assembled correctly.

Gumbiner is a senior applications analyst with the Chicago Transit Authority.

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DBMS Cures Ills Of Registration

(Continued from Page 22)

ed, edited automatically, transferred to the CPU and, once all data is correct, written to the data base.

- As each transaction is written to the deta base, the Central Access Method Program (Camp) writes all new or changed data to a journal tape for backup security. Thus, if an on-line application program abends, Camp will restore the data base using the contents of the journal tape.
- Two copies of the new or updated registration form are automatically printed in the registration and medical records offices using Cullinane's Culprit output processor.

For the inquiry and update functions, data is retrieved by entering the patient's Social Security number, Medical Group accounting number or name. For retrieval by name, a phonetic look-up is permitted.

Four screens are required to display all information concerning an individual patient.

Purchasing History

In addition to the Medical Group registration application, Montefiore has recently implemented a purchasing history application under IDMS. Described by Walker as a "stopgap" measure, the application primarily involves data retrieval from a purchase order data set with minimal updates.

The purchasing department generates reports on all outstanding purchase orders as well as ad hoc reports on the contents of specific orders.

Meanwhile, work has already begun on the conversion of the Medical Group accounting and billing system to IDMS. This project should be completed by mid-1977, Walker noted. Also, the hospital is currently looking into the possibility of converting to IDMS an IBM inpatient accounting package written in DL/I.

Elimination of date redundancy, especially in the area of repetitive names and addresses for patients, emergency contacts and responsible parties accounts for most of the disk storage savings Walker expected.

In addition, a substantial CPU savings has been realized. According to Walker, "Our live system has not come down at all due to a problem caused by IDMS." In general, the implementation of an on-line data base system has meant fully edited data is written directly to the data base, data is made immediately available for billing, inquiry and update purposes, and reports are out on time.

But Walker also pointed out unexpected savings. "Using IDMS, I've noticed for example a marked increase in programmer productivity."

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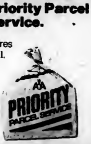

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Users Find Good Payoff From In-House DBMS Training

By Don Leavitt
Of the CW Staff

Careful evaluation of all the alternatives is one of the standards – indeed, very nearly a cliche – of a good and effective move into data base management systems (DBMS). But such a careful selection process is not always part of a good and effective move into training in aupport of DBMS.

In at least two cases recently, user organizations have chosen a training regimen conducted by a firm completely independent of the DBMS vendor. And they made their choices based on considerations completely apart from any attempt at a formal evaluation process of possible suppliers.

Sikorsky Helicopters of Stratford, Conn., asked Data Base Management, Inc. (DBMI) to run some classes oriented to IBM's IMS, primarily on the basis of what DBMI had done previously for Pratt & Whitney, which like Sikorsky is a division of United Technologies, and aeveral other installations in Connecticut.

The Human Connection

In Washington, D.C., Allegheny Airlines first encountered the same trainers through classes presented by DBMI under the auspices of an independent group of users attempting to work with IMS but finding themselvea with a number of common problems.

That class and work DBMI has done specifically for Allegheny since then has convinced Allegheny's manager of systems development, Nick Bredimus, that "DBMI has a real handle on IMS, more so than IBM if you want my honest opinion."

The airline has had IMS installed since 1971 and though it had one major syatem running – "It was a real-time system for cataloging and locating apare parts" – it wasn't until mid-1975 that it began to look at other possibilitiea and the need to beef up ita ataff, Bredimus aaid.

Generally the new ataffers had real-time experience but no exposure to IMS. Allegheny and Bredimus became involved with the Washington-area IMS users group and, about a year ago, DBMI offered to put on a class for the group.

The first course was on IMS's Message Format Services; it laated three days, included 22 students from all the installations in the group and cost only $100/atudent. Bredimua admitted recently he was impressed.

He had been equally impressed, he indicated, with the second group-sponsored DBMI course, though it ended abortively. It was supposed to be on advanced data base design but, after the first day and a half, both the instructors and the atudents realized the content was too elementary for the particular group.

DBMI atopped the claaa right there. "It didn't charge anyone anything and went back to rewrite the course plan. I thought it was very, very good to get that reaction," the Allegheny manager remarked.

Next Bredimus went directly to DBMI and asked the company to prepare a course especially for Allegheny. He knew what he wanted: a course that would emphasize the IMS featurea Allegheny had found useful and which Bredimus wanted to standardize as well as training that would help in planning for the conversion to IMS/VS Bredimus knew was coming.

The tailored course, which took five days, was given to a group of 18 or 19 Allegheny employees. It cost only $500 more than DBMI'a standard course so the added cost per atudent day of the special training was minimal, Bredimus said, adding he expects to use the company again as the need arises.

Independent'a Prices Lower

Back in Connecticut, Sikorsky's supervisor of software, Stewart Stern, had a slightly different view of the economics of using DBMI's trainers in-house. Put very simply, the cost of sending people to IBM's coursea in New York or Boston ia greater than the cost of in-house training as soon as three or more students are involved, he claimed.

IBM offered to bring its courses to Sikorsky, he said, "but they weren't as attractively priced as DBMI." Like Allegheny, Sikorsky usea audio/visual courses for training when its seems appropriate, but none were available in multimedia form at the time. Stern saw the need for DBMS courses.

It was the experience of the other DBMI clients, however, that really moved Sikorsky to opt for the independent's IMS training in-house, the supervisor said. Since then, the company has had the trainers in for courses on data base and data communications programs or on data base design and IMS's Message Format Services, he added.

Stern estimated Sikorsky has a professional DP staff made up of 55 programmers and analysts, another three in data base support and five more in the aoftware support group. Overall, 15 to 20 people have been through each of the DBMI courses, he said.

Looking at Other Optiona

He said he is "atill addressing" the problem of what to do now. There is followup work needed by some who have been through the courses, as well as a need to train some other people.

"But there is no need to have everyone trained in all aspecta of data base and data communications," he aaid emphatically. In addition to DBMI, there are new options available, he said, citing the audio/visual coursea now on the market. IBM's Interactive Training System, also on the market, is, in fact, an IMS application, he pointed out.

Stern will be using those options, he said, but he is atill happy with DBMI'a work, noting – for instance – that DBMI has been hired by Sikorsky to do some "live" conaulting work on a large data communications application, as well as any training that may be needed.

"These guya have the expertise to do real work as well as the knowledge and the manpower to do the training," Stern said.

DBMI is headquartered at Vernon Professional Circle, Vernon, Conn.

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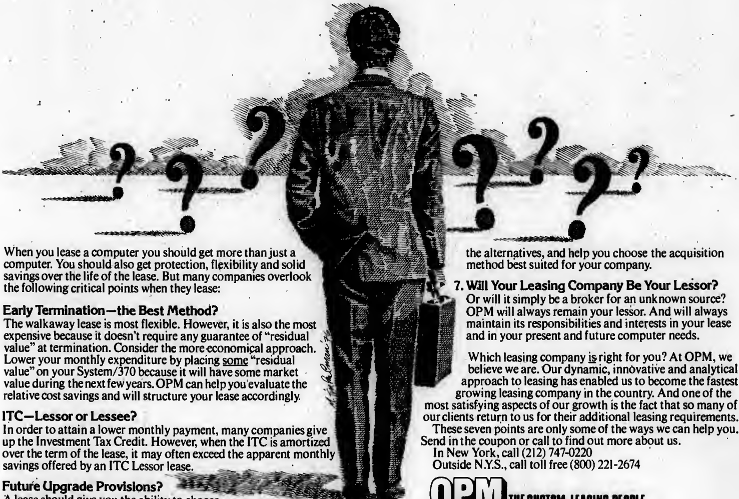
S/370 Computer Leasing: 7 Ways to Avoid Costly Mistakes



When you lease a computer you should get more than just a computer. You should also get protection, flexibility and solid savings over the life of the lease. But many companies overlook the following critical points when they lease:

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2. **ITC—Lessor or Lessee?**
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3. **Future Upgrade Provisions?**
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4. **New Or Used Equipment?**
Should you consider used equipment for all or part of your system requirements? OPM will explore with you the merits of leasing or subleasing used equipment.

5. **Sublease and Assignment Provisions?**
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6. **"Present Value"—The Great Equalizer.**
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Center Sidesteps Cost Hike With ALDs, Leased Lines

By John P. Hebert
Of the CW Staff

SUNNYVALE, Calif. – Faced with a telephone company tariff change that would have boosted its monthly bill for transmission lines as much as $5,000, a large user – and vendor – of computer products here found an interim solution which resulted in increased communications capabilities for the same cost increase.

Andy Failla explains the various functions of rows of Prentice Corp. asynchronoua line drivers in the National Semiconductor Corp. data center.

The solution was asynchronous line drivers (ALD) and conversion from dial-up to leased lines, according to Andy Failla, manager of National Semiconductor Corp.'s Corporate Data Center.

The data center is a crucial division of National Semi, Failla said. Its DP capabilities maintain the present quality of the manufacturer's integrated microprocessor and microcomputer product lines and are used for administrative DP, he explained.

Price increases associated with Bell Telephone's 43401 tariff specification for dial-up lines would have cost the center $3,000 to $5,000 more each month to transmit program development data for processing to the center from National Semi's users across the country, Failla said, adding he is concerned with "making the data center work well at the smallest possible cost to the company."

Utilization of the ALDs has increased asynchronous transmission rates to 2,400 bit/sec and allowed full utilization of the terminals, CPU ports and transmission lines supporting National Semi's data communications applications, Failla noted.

The Prentice Corp. line drivers have also increased line efficiency by feeding National Semi's Product Status System (PSS) data directly into a multiplexer channel and, from there, into the data center's 256K Hewlett-Packard Co. (HP) 3000-II mainframe dedicated to the PSS task. The HP CPU has a 47M-byte disk, one 1,600 bit/in. tape drive and an HP 2640A operator console.

"PSS is the heartbeat of semiconduetor manufacturing activities at National," Failla said, because it monitors the journey of the company's semiconductors through the factory life cycle.

Formerly a manual system, it was first implemented on service bureau computers in 1969.

Cost Trade-Offs

When Pacific Telephone & Telegraph announced it would go to the Single Message Rate Timing (SMRT) tariff and charge for connect time in addition to the basic monthly cost of the lines, Failla decided it would be necessary to make cost trade-offs between type of lines, their cost and equipment "hanging off the lines" to make the data center run as efficiently and inexpensively as possible.

Plans were made and all of the dedicated and dial-up lines were converted to Bell 3002 leased lines, he said.

The one-time costs involved in converting to the leased lines and purchasing the Prentice line drivers were high, Failla said, but corporate management was convinced it would benefit from the money spent.

The 3002 lines have enabled National Semi to utilize the Prentice line drivers, devices with greater speed capabilities at a lower cost than renting standard modems, according to Failla.

The firm is now using 204 ALDs in a point-to-point, time-sharing environment to link Lear Siegler, Inc. LSI 80M1, -2 and -3 terminals "down the road" at corporate headquarters – even though the data center was scheduled to go to a synchronous operation and had Prentice P201 modems on lease for three years, he said.

National Semi considers PSS so critical to its operation that it has a second HP 3000-II acting as backup to the on-line 3000 dedicated to PSS. The second system, according to Failla, is used for material requirements planning and administrative and manufacturing DP, although a priority interrupt provides for switching to support the PSS application if the primary 3000 goes down.

All of the Prentice equipment is modular; if there is a problem with either type of component in the PSS or other applications, National Semi employees – in the field or at the data center – can immediately plug in spare components, Failla said.

In fact, "all things likely to fail on the systems, other than the Bell lines, are modular and can be easily replaced," he said.

There is no need for the diagnostics, Failla said, adding that if an ALD is not working, he sends it back to Prentice.

(Continued on Page 28)

FCC to Hear Industry Views on Inquiry

WASHINGTON, D.C. – The computer industry will be given an opportunity to present its views to the Federal Communications Commission (FCC) at a conference scheduled for Nov. 8 and 9 here.

The two-day meeting is being organized by the American Federation of Information Processing Societies (Afips) for the FCC to provide technological information relating to the Computer Inquiry recently reopened by the commission. One of the main areas of interest in the inquiry is the relationship between computers and communications [CW, Aug. 9].

Five speakers selected by Afips will present papers on various aspects of the computer communications technology. The objective of the conference is tp provide the FCC with a description of current and anticipated developments in computer communications which are likely to affect FCC regulatory responsibilities, according to Keith Uncapher, chairman of the Afips Washington Activities Committee.

A review of current demand for services, current technological capabilities and regulatory problems will be presented by Lynn Hopewell, chairman of the IEEE Computer Society's Computer Communications Technical Committee and senior member of the technical staff at Computer Sciences Corp.

A review of current marketplace needs, pricing trends and local distribution problems will be presented by Alex Curran, president of Bell Northern Research, Inc.

A survey of new research in computer communications, particularly those areas of development which may impact regulatory policy, will be presented by Vinton Cerf, assistant professor of electrical engineering at Stanford University.

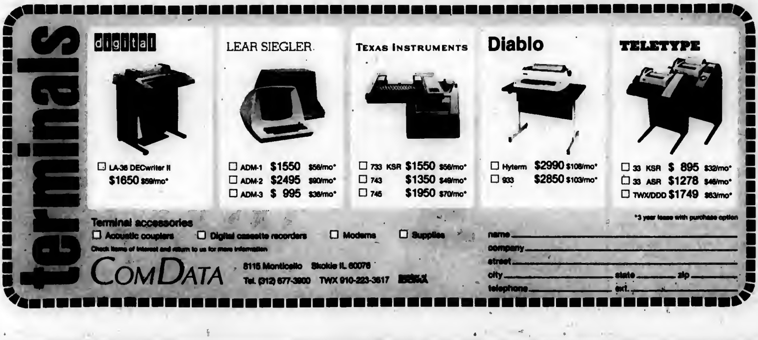
A discussion of institutional constraints and other factors which inhibit the growth of new computer communications technologies will be presented by Donald Dunn, professor of engineering economics at Stanford.

A discussion of possible future development of computer communications capability in the U.S. and causal relationships with FCC policies will be presented by Uncapher, director of the Information Sciences Institute at the University of Southern California.

The presentations will be given to the FCC commissioners and staff. The conference will be open to the public, but participation will be limited to the Afips representatives and FCC personnel.

Users and others interested in suggesting topics that should be included in the presentations should contact Phillip Nyborg, Afips, Suite 420, 2100 L St. N.W., Washington, D.C. 20037.

The conference will be held at the FCC offices, 1919 M St. N.W. The sessions will begin at 9:30 a.m. in Room 856.



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Leased Lines Part of Solution To Rate Increase

(Continued from Page 27)

A "very key man at Prentice," Failla noted, was its worldwide service manager. "He helped to get the PSS system up on the HP 3000 from the [former] IBM 360/65 and got things done.

"I believe in using all the resources of a vendor that I am able to use," he added.

The use of the Prentice ALDs is only a measure to side-step the phone company's rate increase, but the devices will be used in the future, Failla said. He is eventually planning to get into port contention, which he sees as "the final answer" to problems and costs in data communications for National Semi's applications.

The ALDs "will lend themselves very well" to the company's movement toward port contention because the data center will have no surplus gear and therefore no major reworking of present equipment will be required, Failla said.

Rather, there will be additions to the existing facilities of the Corporate Data Center, he said. "We're not locked in on a one-for-one basis – the system has been carefully designed to avoid that," he stressed.

Versitron Nodem Replaces Modem

WASHINGTON, D.C. – Versitron, Inc. has introduced the Nodem modem eliminator to replace modems in local distribution applications.

Nodem has an EIA interface and is transparent to the terminal, according to a Versitron spokesman.

The modem eliminator is capable of full-duplex operation over a four-wire metallic cable at synchronous and asynchronous data rates up to 19.2 kbit/sec over a distance of about one mile, he added.

It can be used as a single-channel device or integrated with Versitron's Cable Driver/Receiver system for multiterminal installation, the company said, adding provision has been made for polled operation.

The Nodem modem eliminator is priced at $544. Versitron is at 6310 Chillum Place N.W., Washington, D.C. 20011.

Service Unit Offered

SAN CARLOS, Calif. – GTE Lenkurt, Inc. has developed the L550A channel service unit to provide interface facilities to its digital data system network at the local loop level.

The L550A is said to condition the data terminal equipment signal for transmission over private-line metallic circuits to the digital system's central office.

The unit provides level adjustment and equalization as well as circuit protection.

Four arrangements are available to match the existing 2,400-, 4,800- and 9,600 bit/sec and 56 kbit/sec line speeds.

A GTE spokesman was unable to quote prices for the L550A. GTE is located at 1105 County Road, San Carlos, Calif. 94070.

Data Center Experiences Many Changes

SUNNYVALE, Calif. – The conversion from dial-up lines to leased lines to support National Semiconductor Corp.'s remote users working on program development data was not the only change the firm's Corporate Data Center experienced recently.

The center, about half a mile down the road from National's corporate headquarters in Santa Clara, also supports National Semi's corporate users of the Product Status System (PSS) for manufacturing control, according to Andy Failla, data center manager.

The foundation of PSS, which Failla called the "heartbeat" of National Semi's product control, was switched from an IBM 360/65 to a Hewlett-Packard HP 3000-II CPU earlier this month.

The center itself had – until last March – been a time-sharing division of Greyhound Computer Corp. which National Semi used for much of its manufacturing control DP.

When National Semi acquired the center, it gained both the IBM 360/65 and the Greyhound staff.

An IBM 370/158 will be phased in soon to replace the 65, assume the corporation's future processing applications and take on some engineering work presently run at service bureaus, he said.

The Model 158 will also support 30 to 40 local and remote corporate users editing and reassembling data and examining system output; in addition, it will support remote job entry and other data entry functions, he said.

All of these functions will be performed on Optimum Systems, Inc.'s (OSI) Wylbur software through Prentice Corp. asynchronous line adapters and Bell 3002 leased lines at 1,200 bit/sec feeding into an IBM 3705 communications control unit.

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Adds Enhances System 70

HAUPPAUGE, N.Y. – Applied Digital Data Systems, Inc. (Adds) has made its recently introduced System 70 intelligent terminal compatible with teletypewriters.

The teletypewriter communications protocol is said to allow System 70 terminals to operate in page, message and conversational modes. It is utilized by loading a 6-sec program.

With the additional protocol, the intelligent terminal can act as an upgraded teletypewriter replacement, transmit data at speeds up to 9,600 bit/sec, edit data locally, store data on diskettes and display upper and lower case characters on the 1,920-character CRT screen, she said.

A System 70 terminal with one diskette drive and either IBM 3780 terminal protocol or teletypewriter-compatible protocol costs $7,295, she said.

With both protocols, the terminal is priced $50 higher, she added from 100 Marcus Blvd., Hauppauge, N.Y. 11787.

HP Introduces the First in a Series Of Small Numeric Data Entry Terminals

PALO ALTO, Calif. – Hewlett-Packard Co. (HP) has ventured into different computer terminal territory with the introduction of the first in a series of numeric data entry terminals.

The HP 3070A and HP 3071A terminals are small desktop units designed for use in industrial and commercial applications by operators who have little or no experience using computer equipment, according to an HP spokesman.

The HP 3070A can be utilized as a complementary device to HP 2100 and 21MX mainframes, although it was primarily designed for operation with the recently introduced HP 1000 system [CW, Oct. 4].

The 3071A numeric terminal can be utilized with computers made by most other manufacturers because it has an RS-232C interface, the spokesman noted.

Both models reportedly can be tailored to users' applications; they have numeric-only keypads for data entry and 16-digit LED indicators that can be labeled to match user-prepared computer programs, according to the spokesman.

Hard-Wired Connections

The HP 3070A is said to be an addition to HP systems used in manufacturing and test and measurement applications.

It communicates to the CPUs through hard-wired connections at speeds of 13- to 230 char./sec depending on the number of terminals on a multidrop link, the spokesman noted.

As many as 63 of the 3070A terminals can be connected to an HP 1000 via a single twisted-pair cable, he claimed. They are capable of automatic error detection and automatic error retransmission through the addition of an optional $1,200 interface to the HP CPU, he said.

The terminal can also be used to link up to 13 HP interface bus-compatible instruments to the HP 1000. The interface enables the CPU to control instruments witin 1.24 miles compared with 60 feet when utilizing standard interfacing methods, he stated.

The HP 3071A is capable of transmission speeds up to 300 bit/sec, he added.

Prices for the HP 3070A and 3071A are $1,470 and $1,285, respectively. Deliveries will begin in November from 1501 Page Mill Road, Palo Alto, Calif. 94304.

Miscoe Introduces Writer Interface

MISSISSAUGA, Ont. – The Miscoe Manufacturing Ltd. Lazzz MCl communications interface was designed to interface the Digital Equipment Corp. LA180 Decwriter to parallel or serial data sources such as CRT terminals or modems.

The interface contains a first-in first-out (Fifo) buffer with 64 to 512 characters; the buffer is used to store an entire message with a blocked-data option, according to the company.

A message can be sent to the printer by the data source after the received message has been verified as error-free, the company said.

The Lazzz interface is available in four versions: basic parallel, basic serial, basic serial with reverse channel response and blocked serial with ACK/NAK response, it added.

The parallel version can accept data into the buffer at up to 9,600 bit/sec, while the serial versions are switch-selectable for transmission speeds up to 1,800 bit/sec and for parity and number of stop bits, according to the firm.

The interface includes an interconnect cable and is said to mount on existing terminal posts.

Lazzz MCl prices start at $400, Miscoe said from 6358 Viscount Road, Mississauga, Ont. L4V 1H3.

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Sanders CRT Unit Features Programmable Micros

NASHUA, N.H. – Sanders Associatea, Inc. has introduced the Graphics 7, an intelligent, interactive graphic display system featuring two programmable microprocessors.

The terminal system is compatible with most computer systems via an RS-232C interface or a high-speed parallel interface and has all the graphic capabilities of Sanders' larger systems, the vendor claimed.

Interactive operations are preprogrammed on the system, Sanders said.

When used with Sanders' optional Fortran Graphic Support Software (GSS) package, the host system allows the user to begin applications programming immediately by freeing the programmer from the task of supporting the terminal, according to a Sanders spokesman.

The Graphic 7 also includes a one-button initiate feature allowing the system to ready itself for operation and allowing the operator to communicate immediately with the terminal or host computer, he added.

Two Microa

The heart of the system is the terminal controller which includes two microprocessors, a display processor and a graphics controller, the company said.

The display processor is a general-purpose unit and operates with 16-bit words or 8-bit bytes; it has general-purpose registers and an 8K 16-bit read/write memory expandable in 8K increments to 24K, the spokesman explained.

The graphic controller is a 16-bit parallel microprocessor with 40 display instructions, 13 display registers and four general registers, providing refresh rates of 60-, 40- and 30 Hz.

A 4K by 16-bit read-only memory (ROM) in the terminal controller contains the control program that handles communications between the terminal and the host CPU, controls the data entry devices, manages the display image refresh and performs other functions usually performed by the host computer, the company said.

The system has two interface options – a 16-bit parallel interface and the RS-232C interface. RS-232 communications are either synchronous or asynchronous at standard speeds up to 9,600 bit/sec, although speeds up to 50 kbit/sec are available for local operation, according to the firm.

The terminal features an interactive graphics capability to and from the host CPU based on only six fundamental messages; this simplifies operations for first-time users, the spokesman claimed.

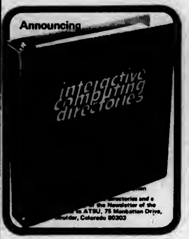
The Graphic 7 includes a detachable keyboard with 54 alphanumeric keys and 32 function keys; a 64-key alphanumeric keyboard with 32 lighted function keys is offered as optional equipment.

CRT characteristics include a directed beam, or random-scan, display technique with cursor stroke character generation defined by Ascii code for continuous linear vector display. Vectors can be drawn to absolute or relative modes.

Four CRT character sizes are available, he noted, and 90° rotation is offered as standard; there is an optional device for rotation of displayed data to any angle.

A basic Graphic 7 system costs $32,800 and includes the standard keyboard, the terminal controller, CRT screen and one interface.

All of the systems hardware components are modular, the spokesman noted from Daniel Webster Highway South, Nashua, N.H. 03060.



Multitech Adds Coupler

MINNEAPOLIS – The Model FM30 is the latest member of the Multitech Systems, Inc. line of acoustic couplers and modems.

The FM30 was designed to operate at rates up to 300 bit/sec in the originate mode.

Full- or half-duplex operation is provided; the unit has both RS-232C and 20mA current loop interface capability, Multitech said.

Features include a crystal-controlled transmitter, active filtering and digital detection in the receiver, the company noted. The price for the FM30 is $270, a spokesman said from 3406 University Ave. S.E., Minneapolis, Minn. 55414.

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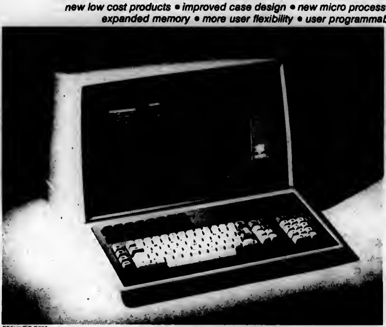
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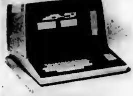
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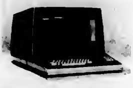
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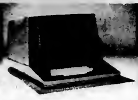
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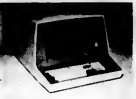
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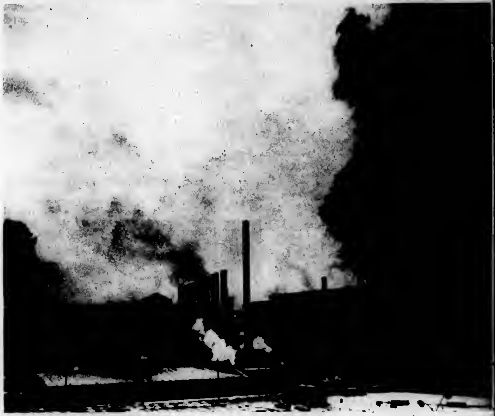

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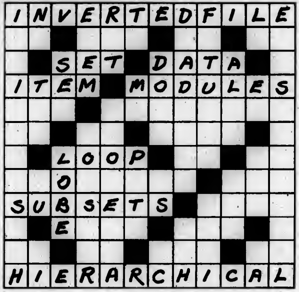
Solving the puzzle of data base management systems



A Computerworld Special Report
October 25, 1976

DBMS Only Partial Answer

Systematic Integration More Important Than Tools

By Chuck Lewis
Special to Computerworld

It is important to recognize the difference between "going data base" and "going data base management system (DBMS)." Unfortunately, many installations do not recognize this difference and go DBMS expecting the benefits of data base.

As a result, they often neither obtain these benefits nor expect the backout costs associated with obtaining them.

To avoid this problem, one should understand the differences between data base and DBMS and plan for data base.

Data base is an approach to data handling, whereas DBMS is a tool for data handling. Data base may employ a DBMS, but using a DBMS does not constitute data base.

Data base is a systematic methodology for the standardization and integration of data at the organizational level; a data base is a collection of data which has been organized by using such a methodology. A data base integrates all data, both automated and nonautomated, and can interrelate data across major functional boundaries.

Data Base Triangle

"Going data base" means an organization is establishing the administrative and technical positions, standards and manual and automated systems which are necessary to integrate the data and service the user community.

Data base design employs all the resources of the organization, creating a data base triangle (see Figure 1) composed of three major building blocks: hardware, software and personnel.

By assigning functions and facilities to each of these constituents in a balanced manner, the data base designer avoids overdependence (or resource skewing) on any one of the constituents, in addition to allowing room for future extension.

Going DBMS means an organization or, more typically, an application group is selecting and installing a DBMS for the purpose of implementing a major application on the computer.

Standardization is only accomplished within this scope, and integration with the other data resources of the organization is typically ignored or given token treatment.

Future integration of such data is assumed. Over time each major user createa a data base and contends for resources in a bottom-up fashion. This contention results from lack of planning or from not taking a data base approach from the outset.

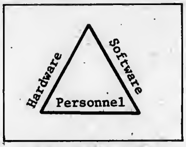


Figure 1. Data Base Triangle

Facilities and Functions

In both data base and DBMS, the required facilities, functions and data must be identified. However, the scope and design requirements of these facilities and functions are considerably different.

Data base functions include administra-

(Continued on Page S/8)

Future Needs Must Impact Evaluation

By David R. Sitek
Special to Computerworld

Assuming an organization has decided to evaluate commercially available data base management systems (DBMS) for immediate or future acquisition, it must then decide what level of effort it is willing to expend determining whether it needs the package and if so, which one.

The evaluation process must focus on the assessment of criteria which are not only critical to the users' current systems but are receptive to planned future applications and prospective systems software enhancements.

Depending upon the nature of the business, it may be advisable to issue a Request for Proposal (RFP) to those vendors who offer DBMS. The formality of an RFP forces the evaluators to carefully decide which elements are significant to the organization and should be stressed to the vendors, in their order of importance.

The naming of the evaluators is one of the most significant steps in the selection process. After all, their recommendations to upper management will most likely swsy the final decision – unless there are political influences outside the scope of the evaluation.

The evaluation team should consist primarily of senior technical people thoroughly familiar with the organizations' applications, but include a representative of management who may ultimately be responsible for administering the package and can play the role of "devil's advocate" during the evaluation procedure.

Decision Matrix

Regardless of whether an RFP is issued or information is obtained directly from the vendor on an inquiry basis, a systematic means for evaluating this data should be devised early in the process. The classical approach is to set up a matrix containing those elements which should be carefully evaluated.

Each element should have associated with it a weighting factor which establishes its relative importance to the organization. It's a good idea to structure the matrix so the elements are listed from most to least important.

Each element, in addition to having a weighting factor attached to it, should be scored in accordance with how well it conforms to the organization's requirement. For example, a score of zero would indicate nonconformance whereas a score of five would indicate total conformance.

After the matrix has been completed each score is multiplied by its weighting factor and summed giving a total matrix score. Additionally, the matrix should be divided into two logical parts. The first part ahould contain those elements of the matrix whose conformance is absolutely necessary to the organization. These elements can be defined as "critical" whereas the remaining can be classified as "desirable."

Vendors may be eliminated from further consideration if they fail to conform to any of the critical matrix elements. (As a rule of thumb, the total points associated with those elements which make up the critical section should represent approximately 60% to 70% of the matrix's grand total points.)

The completed matrices can be used to eliminate vendors through the critical section concept or by analysis of the total score. For instance, if six vendors are evaluated, only the top two or three may be considered for further evaluation. Of course, it is possible the evaluation may end here with the high scorer being chosen.

Having selected vendors for further consideration, the evaluators should devise a scoring technique to assess other criteria, including package costs, user references and published independent studies (e.g., Datspro). Performance/cost and cost/performance ratios (representing relation-

(Continued on Page S/3)

Data Base System Can't Help Some Applications

By Ronald E. Morgan
And John Burke
Speciel to Computerworld

PLYMOUTH MEETING, Pa. – Betz Environmental Engineers (BEE) has used the data base management approach on several of its large water quality management studies. The requirements for such projects can be very stringent, i.e., many times a large volume of data must be established and functioning with report capability in a very short period of time.

In planning, organizing and controlling these processes, the data management system provides the necessary know-how to systematize the management of data and information. In such studies, planners are required to synthesize, reduce and interpret not only very large amounts of data, but also data that describes many different aspects of our environment at many different levels of detail.

This particular environment lends itself to the use of self-contained data base management systems (DBMS).

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The determination of "cost-effectiveness" is always a difficult one when data base work is involved. It is very difficult to put a dollar value on turnaround time and other intangible benefits of data base systems. The decision is further intangible because the very nature of a planning effort makes it difficult for one to know *a priori* how the data will be needed as the planning process progresses.

The problem is basically two-fold: whether computerization is warranted and whether to consider a conventional programming approach or a data management approach.

Many times the resolution of the first question comes as a result of considering the antithesis: "Can I manage the project totally through manual processing of the required data?" If after consideration of this question, the need for computerization is still unclear, further analysis of the data is warranted.

Seven Basic Properties

The consideration of seven basic properties of the data will greatly aid the engineer/planner in the preliminary aspects of considering the DBMS approach. These

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This speciel report was prepared under the direction of CW Associate Editor Don Leavitt. Cover art by Henry Fling.

'Distributed Data Base' Covers Range of Forms, Range of Users

By Mike O'Connell
Special to Computerworld

Everybody talks about distributed data bases, but we all seem to mean something different. That's because there are several forms of this capability, each one suitable to a certain class of application systems. I call these forms distributed access, distributed independent and distributed integrated.

Distributed access is the simplest to achieve and is in use on every system that has remote terminals. Distributed access really has nothing to do with distributing a data base itself; instead, the data base remains centralized and access to the data base is distributed through interactive terminals.

This gives the user the illusion of distributing the data, but permits the applications programmers and data base administrators to work with a single centralized system. Response time for the user and the cost of communications lines may render this choice too slow and/or expensive.

The second form, distributed independent, involves a series of computers, each with a data base of its own, connected through communications lines. Applications programs running on a given machine view that machine's data base as the centralized data base.

However, when that program needs data that exists on another machine in the network, the application must send a message to a sister program running on that other machine, requesting the appropriate data access. The sister program then accesses its own data base and transmits the results back to the original requesting program.

Another way to view this process is to treat the requesting program as if it were a remote terminal in the distributed access mode discussed above. Implementation of this form requires the presence of any so-called centralized data base system and the presence of any network communications software that permits applications programs to send messages to several remote computers.

Each data base is designed as an independent entity and the burden falls on the application programs to determine which machine has the desired data and whether to send a request to the local data base system or to a remote program.

This method cuts communications costs over the distributed access method, because data is stored on the machine nearest the highest volume users, and only requests for seldom-needed data are sent to remote computers. The disadvantage, however, is that programs must know exactly where in the network the data resides, and when data moves from machine to machine to reduce costs, all programs that use that data must be modified.

> *'Communications software is still in its infancy and data base management software is younger still.'*

The design of each data base is simple, since each one is only a part of the entire network of data, but the simplicity of design is more than offset by the application programs having to understand the design of all data bases they access.

Ideal Form

The final form, distributed integrated, doesn't exist today in any general-purpose system. With this form, the data base administrator designs the entire net-

(Continued on Page S/8)

Selection Care Vital to Future

(Continued from Page S/2)

ships between cost and evaluation matrix scores) should also be considered. The user contacts should indicate support personnel required, the number and types of critical vendor calls and the time for the vendor to respond to critical calls.

Vendor Presentations

At this point, it may be advantageous to invite vendors to give presentations – separately – at the evaluators' site. In addition to whatever "canned" marketing pitch each vendor might have, these sessions should include question and answer periods to clear up loose ends.

The above evaluation criteria can be used with the evaluation matrix scores to make up a summary matrix in which each major category is weighted according to its importance. Then a final score for each vendor is compiled. The vendor with the highest score could then be selected or, if two or more vendors are still very close, further evaluation and narrowing of the field could ensue.

Final Test

This might be the time to conduct a benchmark, but probably for no more than two or three packages since the cost of more may become prohibitive. The benchmark should support or nullify claims which the vendor has made, establish whether a typical customer application with its associated data can be successfully handled and provide some evidence of the efficiency of processing each package.

In order to conduct a fair and meaningful benchmark, the following rules should be observed for all vendors:

- Run the test at customer's site.
- Use known customer application.
- Complete the benchmark within a given time frame.

For his part, the user must:

- Assign technical personnel from the evaluation committee to work closely with the vendor.
- Have a specific technique for evaluating all areas of the benchmark.

Measurable outputs of the benchmark should include:

- Program execution times.
- Data load rate.
- Main storage and auxiliary storage utilization.
- Elapsed wall clock time.
- Data retrieval times.
- I/O activities (how many I/O's to satisfy a particular data requirement).
- Device time by unit.

Less quantifiable, but just as significant, would be judgments on ease of use of package modules and associated documentation problems encountered throughout the benchmark and quality of vendor support.

The summary matrix score combined with the results of the benchmark should provide adequate information for selection of a vendor. The final selection may also be influenced by the fact that the product comes from a vendor with whom the customer has done business in the past and who has a feeling for support and quality of the product.

Whatever the final decision, the effect on the organization as far as its future performance is concerned could be seriously impaired if the selection process is taken lightly.

Sitek is data base administrator with the Office of Computer Services & Information Systems, Metropolitan Dade County, Florida.

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Wisconsin Team Sees Benefit, Cost of In-House Effort

By Barry L. Larson
Special to Computerworld

The Wisconsin Department of Transportation installed a data base management system (DBMS) in February 1974 which is unique in that all data access is performed at the data element level.

The past 2-1/2 years have seen three major application systems put in production under the DBMS, with a fourth scheduled by the end of the year. Production operation of the data element-oriented DBMS provides considerable insight into the strengths and shortcomings of such an approach.

The department embarked on the data base path in early 1971, beginning with a lengthy evaluation of data base management and data communication systems then on the market. The major objective was to find a DBMS that could be used to support the department's two major Division of Motor Vehicles applications, the 7-1/2 million record vehicle registration and drivers license systems, in an on-line update environment. The investigation revealed that none of the products available met the needs of the department.

Following this evaluation, the department made the decision to begin in-house development of a DBMS which would be more suited to the extremely large volume, "flat" file characteristics of the two major motor vehicle applications. A software development project was initiated in early 1972 and was successfully concluded in February 1974 with the implementation of the data base/data communication support system, which comprises about 100,000 lines of source code.

The heart of the system is the data element dictionary that describes every data element known to the system. It gives the data element name and describes the data element attributes for its physical and multiple external representations; it also specifies the required mapping transform needed to convert from one representation to another. In addition, the dictionary indicates the physical file on which the element resides as well as the access strategy to employ in obtaining it.

The file structure is best characterized as a wide, flat file capable of being fully inverted. The records are variable length, utilizing a bit map to indicate the presence or absence of the data element values within the record. A hashed index file is maintained for each data element that is inverted. These index records contain the address of the block in the directly addressed master file that contains the related data element values.

> *'The high degree of application program/physical file independence provided by the DBMS is undoubtedly its greatest strength.'*

All application program data base accesses, both batch and teleprocessing, are done at the data element level; the requesting program merely supplies a list of data element names it wishes to operate on. A representation number is appended to each data element in the request list to specify to the DBMS the particular external representation of the data element with which the application program is dealing. The qualification, or key, is capable of handling Boolean expressions and is also specified in terms of data element names and representation numbers.

The high degree of application program/physical file independence provided by the DBMS is undoubtedly its greatest strength. New data elements can be added to existing data bases by simply defining the new elements in the data element dictionary and including the element in those programs which deal with it.

Changing Devices

A data base migration from one device type to another has been accomplished; it required only execution JCL changes to the DBMS and no application modification. This occurred in early 1974, when the 4-1/2 million record vehicle registration data base was moved from 2314- to 3330-compatible disk storage.

An operation quite similar to reordering a record layout in a conventional file arrangement has also been performed. This was done to the vehicle registration data base during production test, illustrating that physical data base records can be restructured transparently to programs using the data.

Another benefit of the data element approach is that it promotes the compilation of an inventory of the data elements used by an organization. Since detailed definition is required for each data element contained in the data base, assembling a complete catalog of an organization's data elements becomes a natural follow-up.

The department's reduced disk space requirement is also due, in large part, to the element approach. The 4-1/2 million record vehicle registration data base, including three random indexes, occupies nine spindles of single-density 3330-compatible disk, less than the conventional file it replaced. Estimates developed during the 1971 DBMS evaluation indicated about 36 spindles would have been required to implement the same data base under a currently available commercial DBMS.

Much of the economy of space is achieved by carrying only real data element values in a data base record. Those elements not having a value in the record are said to be null and require no filler to be carried.

Since access is at the data element level and mapping from the internal to external representations is always required, it is convenient to encode many of the element values, providing an additional economy of space. Blank compression is also performed at the record level, further reducing the space requirements.

Availability is enhanced by minimizing the need for reorganization of the data base, with its attendant outages. The vehicle registration data base required its first reorganization 18 months after implementation, and then only because the growth in the file size required that additional disk space be allocated.

This data base, incidentally, is rather volatile, with approximately 90,000 to 100,000 updates applied per week. The influence of the data element approach is also evident here, in that it lends itself to a flat file organization which minimizes chaining and the subsequent need for frequent reorganizations.

In summary, the Department of Transportation has found that a number of very real productivity benefits can be derived from the data element orientation. These benefits come at a price, however, and that price is the equipment cost, or CPU cycles, needed to support the DBMS.

Larson is an analyst with the Bureau of Systems & Data Processing, Division of Business Management, Department of Transportation, State of Wisconsin.

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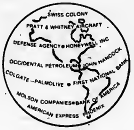

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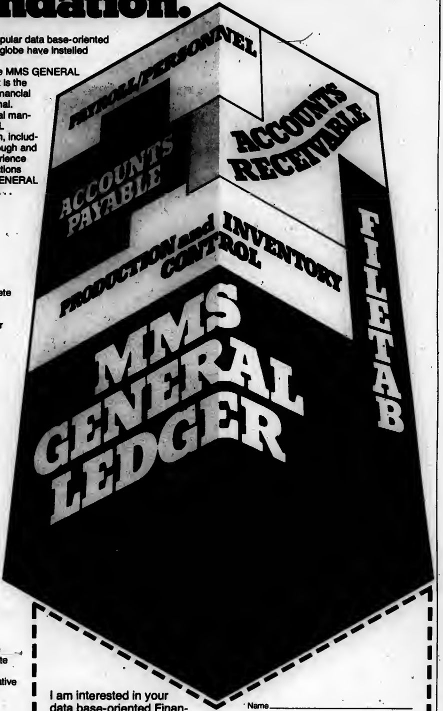

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'Datacore' Tracks Education Trends for State Unit

ALBANY, N.Y. – An office of the New York State Education Department has set up an information system called Datacore that can quickly and efficiently retrieve enrollment and other data vital to the analysis of postsecondary education trends. This would have been a nearly impossible task without the facilities of the Data Management System (DMS) which is available on a time-shared basis through General Electric's Mark III network, state officials noted.

The Office of Postsecondary Research, Information Systems and Institutional Aid (Oprisia), headed by Dr. Paul Wing, is responsible for compiling the data and providing analysis and interpretation on a timely basis. This is a critical aspect for such functions as fiscal planning, developing financial aid strategies and enrollment projections for approximately 250 degree-granting institutions in New York State.

As the number of students attending New York State's degree-granting institutions neared the one million mark, accompanied by pressing fiscal circumstances of both the state and the nation, Oprisia sought a method capable of managing the multitude of data necessary to assist the department's postsecondary planning function.

"With Datacore, we're doing something that was practically impossible just two years ago," Wing said. "When information was requested it was often late, required a tremendous amount of clerical work and its usefulness was generally diminished."

Condenses Data

Now, since Datacore serves as the repository for official historical data from 1969 to the present for all postsecondary educational institutions, Oprisia can access any of its 2000 master records and 12,000 dependent records, containing close to 100 data elements, to gain information useful in analyzing trends, answering requests from various sources and preparing reports for a multiplicity of state agencies.

Datacore contains data regarding the type of institution, such as whether it is a four-year university or a two-year community college, its location, various enrollment statistics, and information concerning admissions, degrees granted and facilities. The data base is organized in a DMS hierarchical structure, allowing for a natural and efficient configuration of related data that can easily be modified. In the near future, Wing said, financial and budgetary data will be added to the system.

When information updating is required, an average of twice each month, data gathered by the department's Bureau of Statistical Services is provided to Oprisia. The updating module is then executed in a deferred mode for overnight processing.

One of the key reasons for using DMS in developing Datacore was the data base management system's quick and easy start-up and simplicity of operation, which Oprisia found particularly appealing, according to Wing.

"DMS has reduced the need for computer programming expertise in our operation," Wing said. "In fact, no one in the office really had much computer expertise when we first undertook its development."

Dave Waters, an Oprisia education aide, has handled Datacore through its initial developing stage, but will soon do more analysis and interpretation work as the responsibility of the system's operation falls to a clerk and an Oprisia entry-level professional.

"DMS has allowed Datacore to provide information very fast and in an organized manner," Waters said. "Consequently, we have increased our effectiveness."

The English-like retrieval and reporting language of DMS allows the user to generate ad-hoc reports to fulfill unanticipated requests in an efficient manner. For example, the office was able to provide the Region II Office of Health, Education and Welfare (HEW) with information related to the Federal government's swine flu vaccine program. HEW needed to know the number of full-time and part-time students in New York State's 250 postsecondary institutions. Before Datacore, the headcount would have had to be done manually, tying up several persons for hours, according to Waters.

Datacore is used daily by Oprisia as it receives requests for information from many government agencies, including the governor's office, state legislature and from within the education department. Wing said most requests for basic information are answered within 15 minutes.

Besides providing a variety of requestors with information, Oprisia uses the system to prepare comprehensive annual reports on enrollment, degrees granted, graduate and undergraduate admissions and facilities for department use in planning and forecasting. One of the more complex problems solved by Oprisia is the forecasting of student participation in New York's postsecondary institutions as far as 18 years into the future.

Wing sees Datacore as a computerized information system that provides the department and others with timely information about postsecondary education in New York State, whether it be answers to simple requests for statistical data or finished comprehensive reports.

The system's success in providing such information quickly and efficiently has resulted in plans for its expansion into other informational areas that could be of vital importance to postsecondary education, according to Wing.

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Systematic Integration More Important Than DBMS

(Continued from Page S/2)

tion and control; definition; maintenance; data collection and dissemination; and privacy, security and integrity protection.

To implement these functions, the data base designer may employ a DBMS, data dictionary, sequential files, manual files, intelligent terminals, minicomputers, manual forms and procedures, hardware redundancy, encoding/decoding standards, data administrator and multiple data base administrators.

DBMS functions are very similar to data base functions (one source of confusion), but because the scope is considerably smaller, the facilities used to implement these functions include query languages, host language interface, hierarchical and network file structures, report writers and data base administrators.

In approaching data base, a catalog of the functions, data and relationships necessary to support the various stimuli of the organization must be developed to ensure appropriate data base design and selection of hardware, software, personnel and administrative policies and procedures.

A major objective is to minimize the storage, software, maintenance and staffing redundancy in the organization.

In approaching DBMS, all organizational functional areas except one or two are basically ignored. The development team is only concerned with data to be automated by way of the DBMS.

Often the team is indifferent to other users of the DBMS because no one oversees sharing of the DBMS. A major objective is to minimize redundancy within the file through the structuring facilities of the DBMS.

Of course, going DBMS rather than data base is often a matter of practicality. Either the time, money or senior management support required for the front-end analysis and planning required by data base is not available. Data base is an organizational decision; DBMS is a systems programmer decision.

In such cases, after exhausting all possible means of acquiring these resources, it should be clearly understood and documented that the move to DBMS is to satisfy specific automated requirements.

There are installations, however, which may be in a position to go data base, but choose to go DBMS because of a lack of foresight.

This is a mistake.

When you are investing $1 million to $3 million in DBMS, investing $75,000 to $200,000 and five to 10 months in a front-end study and education program to make sure you are doing the right thing in the long run is very affordable.

Benefits Not Realized

The danger of going DBMS is not only that data base benefits may not be realized. An organization can work its way into a situation such that conversion or "phasing into" data base may only be accomplished by backing out a high percentage of the software and effort that went into going DBMS.

This can occur when insufficient initial requirements analysis is performed before the data base administrator, DBMS, data dictionary and teleprocessing monitor are selected and when use of the software and development of new systems by various groups is not coordinated.

When one considers the move to DBMS may amount to millions of dollars of effort over two to four years, this is a considerable risk.

In short, going DBMS can, in two to four years, lead to the same problem (i.e., redundancy, lack of coordination and limited growth potential) it is designed to avoid now.

The trade-off between DBMS and data base is short-term results vs. long-term potential. Few organizations will commit themselves to a five- to seven-year data base plan without seeing short-term results. Likewise, few organizations will knowingly commit to a two-to-four-year DBMS plan without seeing long-term potential.

The resolution is to adopt a top-down approach to data base. Analyze all the entities and stimuli of the organization and the corresponding data and functions, acquire the appropriate resources and then implement data base in stages.

Major Tasks

The major tasks in this approach are as follows:

- Establish data base with the aid of the data administrator. Assign the data administrator the task of implementing data base within the organization and give him the senior management support, time and capital necessary to perform the following steps.

If it is not politically expedient to establish this position initially, a team of consultants can be used to perform the subsequent steps. However, the establishment of the data administrator and firm senior-management support should not be delayed for long.

- Establish the data base analysis/design team. Choose backgrounds and contacts and educate the members as to what they are trying to accomplish.
- Perform an operations analysis. Identify the candidate operations to be represented in the data base. Determine expected costs, benefits and milestones for its development. Examine alternatives and perform a feasibility analysis. Make a go/no-go decision.
- Perform a systems analysis. Define the operations of the organization in terms of entities and stimuli. Translate these into data and functions.

Define data sources, users, redundancies, ambiguities, relationships and terminology. Define the data, relationships, frequency of use and response requirements for each function.

Build a data model, functional model, organizational model and a list of necessary standards. Balance the mapping of data and functions into hardware, software, personnel and manual systems.

Adjust the mapping to constituents and produce specifications for the necessary tools – including the DBMS.

- Acquire the necessary tools (DBMS, hardware, other software, personnel, etc.) to implement the first phase of the data base and proceed with development, conversion, standardization and implementation.

Go DBMS on a target area and prepare other areas for integration and elimination of redundancies through standardization.

- Gradually move from DBMS to data base.

Lewis is manager of the Database Services Department of CACI, Inc. in Reston, Va.

Definition of Distributed Data Bases Confused

(Continued from Page S/3)

workwide data base as a single integrated data base, as though it were to be centralized. The application programmers see this single data base and write their programs as though there were a centralized data base.

However, when the data base administrator maps the data base onto disk files, the mapping involves disk files that happen to be attached to several remote computers, instead of all being attached to one monolithic computer. This method permits a single integrated view of the entire data base with its simpler control and applications programs.

In addition, the data base administrator can freely move data from computer to computer without impacting application programs.

Implementation of this method requires the vendor's data base management software and communications software be integrated to talk to each other. An application program's request for data base services is handed to the data base management system (DBMS) residing on that same computer.

If the DBMS determines the requested data is on the same computer, it is accessed. Otherwise, the DBMS must request its communications software to send a message to another computer in the network.

The work to be done with this method is identical to the distributed independent method, but the responsibility for doing the work is shifted. With distributed independent, the application must make the decisions and make the right requests of the right computers. With distributed integrated, the burden falls on the vendor's software, and the user's programming chore is much simpler.

Today's user who has a computer with remote terminals already has distributed access. Today's user with a network of computers connected by programmable communications software can achieve distributed independent, but with a great deal of planning and very complex applications programs.

It seems clear that the user of tomorrow will want the best of both worlds, with the simplicity of distributed access and the power of distributed independent, which I've called distributed integrated.

Communications software is still in its infancy and data base management software is younger still. It won't be long, though, before each of these technologies will be firm enough to permit the careful grafting of one onto the back of the other to provide power and flexibility of data access to match the power and flexibility already recognized for distributed computing systems.

Offload Communications

On a slightly different subject, there seems to be a great deal of interest in distributing the load of a single processor, even when no remote computers exist. This interest has arisen from the success of front-end communications processors which serve to offload the message-handling task onto a computer specifically configured to do that specialized job.

But if offloading the communication with terminals is a good idea, why not offload the communication data bases? In other words, why not have a closely coupled system with a communications front end, a general-purpose processor and a data base back end?

Some experimental work has been done in this area and a number of studies have been funded to determine the optimum approach to this problem, but no general-purpose system is offered today to provide this capability. The user who wants to do it without waiting for the vendor must have a hardware configuration that permits processor-to-processor communications at a high data rate and must be willing to write specialized applications programs that communicate between the central processor and the back-end processor that contains the DBMS.

O'Connell is a product planning and promotion manager at Digital Equipment Corp. and chairman of the Codasyl Data Base Language Task Group.

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Space Saving Biggest Problem

Many Options Open to Users Who Want DBMS on Mini

By J. Aaron Zornea
Special to Computerworld

Few minicomputers are equipped with the software selection delivered with large machines. However, the usual restraints of a mini system often mean data redundancy is a serious problem and data base management systems (DBMS) are needed.

Various vendors have begun to respond to user requests for DBMS and packages are currently available from:

- Minicomputer manufacturers. Digital Equipment Corp. (DEC) has released Record Management Service-11 (RMS-11). For the PDP-11/70, DEC has worked with Cullinane putting together DBMS-11, an adaptation of IDMS. Other manufacturers with packages available or close to release include Hewlett-Packard (Image), Interdata (Interbase) and Data General (Infos).
- Independent software houses. ELS Systems Engineering offers Product 3 for DEC's PDP-11 and for other minis on special order. Cincom Systems has Total for Varian and other systems, and minicomputer software directories show about 20 other DBMS available for the more popular minis.

If your particular mini has no DBMS currently available and you don't want to tie up your staff writing data base software, your options are switching to a vendor that has – or soon will have – a DBMS, contracting with a software house to design a system for your mini or converting a successfully running data base package to your mini.

'Once a system is in place, the "turnpike" effect will also make itself felt. As the system becomes operationally successful, more and more large applications will come on board and the internal resources may be strained.'

The second option has advantages. You will get, presumably, a working system and it will not tie up your systems people in the development phase, assuming the vendor has experience developing data base software and is familiar with the features of your mini which can be built into a DBMS.

Transporting and tailoring a system to a new environment can be a nightmare. The headaches unique to a DBMS can be minimized, however, if you:

- Choose a system that is running successfully on another machine, not excluding large computers. Don't be a test site for unproven software.
- Capture a highly portable system, written in the same high-level language your mini supports.
- Get involved at the systems level, even minimally, to guarantee in-house maintenance capability later.
- Recogniza that a running system gets the job done. On your configuration, however, you can fine-tune the software as time allows.
- Recognize that transporting the programs across vendor lines may require some planning and work, particularly if I/O modules are device-specific.
- Assign a person knowledgeable in the use of DBMS – usually the project leader – to resolve system problems.

The cost per line of code is roughly the same for the system whether it be large-scale or mini. On a mini, however, moving data around is no bargain: bit manipulation has to be done in Assembler.

A mini also has slower compilation, linking and loading times which add to development costs. An alternative is to use a cross-assembler to develop and test code on a large system and then move the object code back to your mini for use.

In order to fit the DBMS, operating system and application programs into a mini's generally limited main memory, the data base control system should be as compact as possible. Some features of larger DBMS – editing routines or other protective mechanisms, for example – may have to be omitted.

Since most minis are located away from experienced personnel, documentation has to be fairly straightforward and system generation, recovery and restart procedures have to overcompensate for the lack of knowledge on the part of the user.

Once a system is in place, the "turnpike" effect will also make itself felt. As the system becomes operationally successful, more and more large applications will come on board and the internal resources may be strained.

Zornes is a systems programmer at Diversified Data Systems, Tucson, Ariz.

'Base' Approach Wrong for Some Data

(Continued from Page S/2)

properties are:

- Ultimate size of the data base. This property alone can often be the decisive one. If the data base is large, manual manipulation will simply be too time consuming and error prone.
- Structure of the data. This also is a very important question when considering a DBMS. For instance, if one is inventorying n facilities, each with exactly two pipes and discharging exactly four parameters, then a DBMS is probably not justified. On the other hand, if a given facility may have from one to 30 pipes, each discharging one or more of 70 different possible chemical parameters, then a more versatile structure (such as a DBMS) is definitely worth consideration.
- Data relatability. This property is a measure of the overall "relational" aspects of the data. If the data has "relational" properties, then a relational data base should be considered. For example, in a water quality management planning process, data collected at a sampling station only takes on meaning as it is related to upstream industrial and municipal facilities, upstream water quality and overland nonpoint source loads.
- Variability of the data elements. This property is a measure of the time variability of a given data element's intrinsic properties. The critical examination of this property gives the decision-maker a feeling for the overall stability of the data. DBMS tends to be more effective at handling data which changes frequently.
- Variability of the data base. This property is a measure of the rate of change of the data base itself. For example, how often will it be necessary to add, delete or change the data items. Under classical programming techniques, every time a data item is added to or deleted from a given file structure, all programs accessing that file must also be changed. However, within the structure of DBMS there is an independence between the program and the data. If the data has a potential for a large number of changes, DBMS can be very cost-effective.
- Number of different ways the data will need to be reported. This property is an attempt to measure the frequency and types of reports required. If information demands the data be displayed in many different ways or if it is not certain how the data will be required, the DBMS approach has distinct advantages over a more conventional approach.

However, if a set of reports is required at regularly specified intervals, DBMS could be very costly to use. Thus, if the types of reports required are not well specified or if reports are required very quickly on the spur of the moment (i.e., an on-line inquiry situation), DBMS will tend to be very cost-effective.

- Number of different types of users of the data. The other six properties previously discussed are not necessarily independent of this one. The more different types of uses the data base will be subjected to, the more difficult it will be to define the variability of the data and data base and the different ways the data will need to be accessed and reported.

Cost Estimates

For some cost guidance, we have prepared cost estimates for three of our larger data bases. We should point out, however, that costs will vary depending upon the DBMS used, the size of the data base and the complexity of the data base.

To obtain a "usable" measure, we decided to use the "cost per data item" to establish, verify and update the data base. This will simply be calculated by adding the costs for data entry and programming for the establishment, verification and update of the data base to the computer costs (CPU usage, connect time and storage) and dividing that sum by the total number of data items on the data base.

$$Md = \frac{\text{Manhour Cost} + \text{Computer Cost}}{\text{Data Items}}$$

The following table summarizes our costs on three projects:

	Manpower	Computer	Total
A	$1,400	$1,300	$2,700
B	$1,700	$1,600	$3,300
C	$13,800	$7,000	$20,800

The number of data items can be calculated by multiplying the number of occurrences at a given level times the number of data items at that level and summing over all levels. In summary:

Data base	Total No. of Items
A	37,000
B	25,000
C	222,000

Dividing these by the implementation costs, we get costs per data item established.

A — 2700/37000 = 7.3 cents
B — 3300/28000 = 13.3 cents
C — 20800/222800 = 9.4 cents
Average = 10 cents

We certainly cannot conclude that all data bases, even if established with Nomad, will cost 10 cents per data item. The cost will vary in accordance with the size and complexity of the data base established.

Morgan and Burke are systems analysts with Betz Environmental Engineers, Plymouth Meeting, Pa.

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Eclipse Linked to 370

Mini-Based System Backs Long-Range Louisiana Plans

BATON ROUGE, La. – Long-range planning for a city, county or state is an art that can probably never be completely computerized, but the data needed for planning can be collected and structured into an information system and made readily accessible for planning decisions. Louisiana's State Planning Office (SPO) is implementing just such a system.

The project began four years ago and now brings together the source data of hundreds of state and local government agencies and makes it usable for long-range planning. The SPO uses a Data General Eclipse C/300 that functions both as a local processing system and as a remote job entry Hasp workstation to an IBM 370.

"We chose the Eclipse to supplement the large computer because it was able to meet our specifications of flexibility, extensive software support and data base capability. It also met our budgetary constraints," Paul R. Mayer Jr., assistant director of the SPO, said recently.

Part of the governor's office, SPO is chartered to advise the executive branch on matters of planning and development at the state level, as well as other branches and levels of government on request. The SPO also serves as a consultant to regional, local and specific interest groups.

To supply these services, the SPO has a legislative mandate to "identify all information to be collected and assembled with respect to the goals of the state and the development of programs and plans affecting the state and is responsible for the establishment of basic statistics to provide a common source for all planning." It then must "collect, analyze and report physical, social and economic information to state government operations."

The Comprehensive Planning Information System (CPIS) is a result of this mandate. "We first became interested in a data management system when we found the types of data we needed to perform our planning functions were not available," according to Mayer. Secondary sources were never up-to-date, or the data was in a form we couldn't use, and consultant's studies were outdated when we received them.

Multiple Needs

The basic informational needs of the SPO include both data for special one-time projects and data used over and over again, such as the results of a census. The storage, facilities and data file organizations as well as the processing, programming requirements and data integration procedures vary considerably for each.

Activities as different as routine report generation and economic modeling require different operating procedures, hardware and software capabilities and programming support. All these factors had to be considered in the CPIS design.

The CPIS also had to solve three major information-related problems: first, the lack of good data; second, discrepancies between data collections from the various agencies, due to different calculation methods or incompatible data bases; and third, inefficiency of locating data through personal contacts and accessing the data once located.

Another group of problems concerned the system itself. Without an in-house system or communications access to a host system, the SPO staff's use of computers was dependent on the priorities of other agencies. Timely DP support could be obtained only in high priority situations, and then only at a high time/cost trade-off.

In addition, incompatibility between computer systems made it difficult to execute a planning project that required data or programs from several unrelated systems.

The SPO also had to factor in the nature of its own functions. While system devel-

(Continued on Page S/12)

Relational System Adapts to Changing Aims

By Don Leavitt
Of the CW Staff

WARREN, Mich. – The main power of the Relational General Information System (Regis) installed at the Research Laboratories of General Motors Corp. here is its ability to handle unplanned queries and to enable the user to work with intermediate results to determine the future course of his analysis, according to two of the laboratories' computer scientists.

In a paper prepared for the 1976 National Computer Conference, John D. Joyce and Nissim A. Oliver explained that in the design of Regis "an emphasis is placed on providing a view of data in which the relationships are easily understandable and easily manipulated to derive new relationships."

Of particular importance, they noted, is the capability to handle groups or sets of information. "This is different from handling one record at a time such as in the Codasyl Data Base Task Group approach," they added.

While Regis supports an interface to programs written in conventional high-level languages, it also – perhaps more importantly – has a substantial command language of its own, plus linkages to statistical analysis and flexible graphic output routines, Joyce and Oliver said.

Developed from the experimentation, design and implementation work of Dr. Kevin Whitney, and now running on an IBM 370/168 under the TSS operating system, Regis is clearly designed primarily for the interactive mode in which the user can extract and analyze information and make analyses based on the information he has just learned.

'Jargon' Inappropriate

The users' view of a relational data handling system is markedly influenced by the approach and terminology by which the subject is introduced to him, the authors said, adding "some of the precise terms of relational theory are simply not appropriate to use with potential users."

"The user must be approached with simple terminology and meaningful explanations of the concepts and ideas involved . . . Potential users, including ex-

(Continued on Page S/12)

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Chair Maker Cuts Inventory as Production Jumps

MONROE, Mich. – Data base techniques have been a key behind La-Z-Boy Chair Company's reduced inventory and increased production, according to Otto Smoktonowicz, the company's manager of programming and analysis.

In the last two years the company has reduced its inventory of covering materials from 2.3 million to 1.3 million yards and has increased the chair production rate at its seven manufacturing plants from 3,500 to 4,500 chairs per day, he said.

Cover is La-Z-Boy's most expensive inventory item. Two years ago, the company's 2.3 million yard inventory was valued at $5.5 million, he noted.

In the past, the 1,000 stocked covers needed for production of the company's 250 manufacturing styles were ordered from the mills for direct shipment to the seven plants. Plant receipts were hand-posted to ledger cards and then entered into computer inventory.

Under this system, on-hand inventory was inaccurate, often causing expensive interplant shipments and production delays despite the large inventory, he said.

"If a figure was within 50% of being accurate, it was considered good," Smoktonowicz remarked. "Corporate management decided there had to be a way to reduce inventory and, at the same time, make inventory allocation more accurate and timely."

Distribution Center

As a result, La-Z-Boy established the Fabric Processing Center as the central warehouse and distribution point for all cover needed on a corporate basis, he said. The center, in turn, ships cover on an as-needed basis to the company's seven manufacturing plants.

The center has a completely automated storage and retrieval system which is run by a minicomputer, he noted.

Tape-to-tape transmission links the minicomputer with La-Z-Boy's NCR Century 251 computer which is located at the company's main DP center here.

Using data base techniques, the CPU has been programmed to consider a variety of data including on-hand inventory, purchase orders, expect-to-ship dates, mill returns and lead times, items in transit and uncut backlogs in determining a priority basis of allocating cover to the manufacturing locations, he explained.

However, management still has the option of overriding the priorities established by the computer by ordering a "forced pick" when necessary, he noted.

An outstanding feature of the system is its ability to operate in an analysis mode, according to Smoktonowicz. This enables La-Z-Boy to assess how a shift in cover allocation priorities would affect each plant. This assessment can be made without making a commitment to the proposed change.

"Suppose a big order has just come in for a chair style manufactured at one particular plant," he explained. "Management may think so many yards of cover should immediately be shipped to this plant to meet the new demand.

"However, before making that decision, management may want to examine what such a priority shift would do to the other plants," he added.

"Using the analysis mode, management will have its answer within 18 minutes. All of the necessary calculations will be made without changing one bit of data in the base," he said.

The company looked at sequential and index sequential processing before deciding on data base, Smoktonowicz indicated.

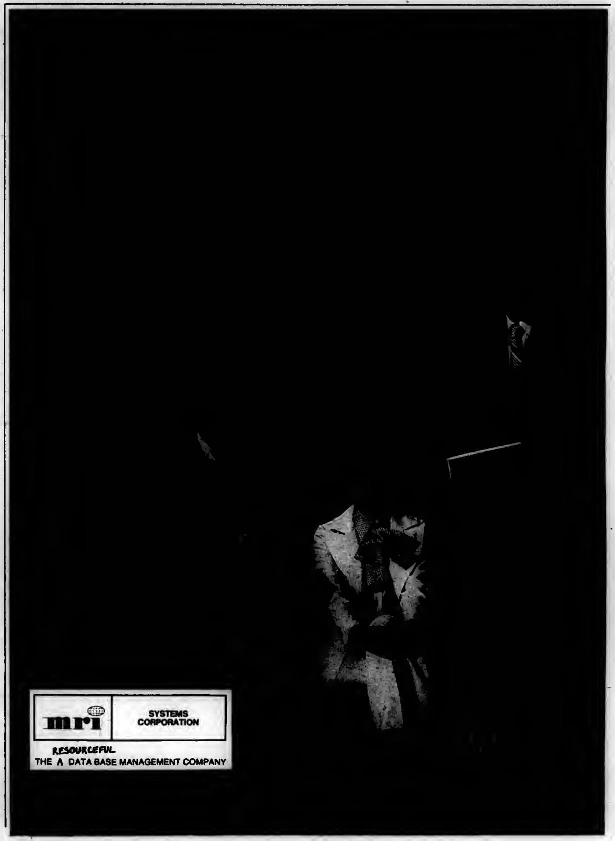
Sequential processing lacked flexibility while index sequential didn't permit accessing the same data from different directions or independence of data from processing. The company felt NCR's Total could solve its various problems, he said.

La-Z-Boy needed a system which was fast, accurate and flexible. Data base techniques dovetailed to meet these requirements, he noted.

Smoktonowicz added any company which is thinking about adopting a data base system should ask itself the following questions:

- Is independence of the data from the processing logic important?
- Is random access desirable because there are few inputs compared with the master file sizes – or for any other reason?
- Is accuracy crucial, indicating reference to supporting transactions rather than summary counters?
- Do you want this system's design to be independent from the design of future systems – or vice versa?
- Is it necessary to access a logical group of data from different directions and for different reasons while protecting the integrity of the data?
- Do you want a single transaction to undergo all validations and updates within one input "READ"?

If the answer to one or more of these questions is "yes," data base techniques should be considered, Smoktonowicz said.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Mini With Access to 370 Backs Long-Range Planning

(Continued from Page S/10)

opment for line operations assumes the processing will be routine, the data base relatively stable and applications constant, these elements are highly unpredictable in a planning environment and require a different, much more flexible system design.

The first step in the CPIS development – which was done by Kim Johnson, an independent consultant under contract to the SPO, was the formulation of basic concepts, evaluation of needs and constraints and setting up a project framework.

The system designers formulated an operational plan, evaluated existing systems for transportability and identified the central file software to be used – National Military Command System Information Processing Formatted File System (Nips).

The next step was operational system development, modification, initial testing and the acquisition of the initial data, software and hardware components. Operational tests of pilot projects were performed for municipal, regional and state agencies.

These projects included unemployment studies, housing surveys, flood damage assessment, revenue estimation, industrial development, map production and many others. The projects required a variety of data, processing techniques and I/O options so that all major system components were tested in a live environment.

Hardware Components

There are three groups of hardware components in the CPIS, each located in a different area. The Eclipse at the SPO has 128K bytes of core memory, a 10M-byte disk, 300 line/min printer, 1,600 bit/sec magnetic tape unit, 400 card/min reader, teletypewriter operator's console and CRT with keyboard.

The IBM 370/158 is located at the Department of Highways. The SPO is now making arrangements to link the Eclipse to a Honeywell 6080 at the state computer center as well.

The SPO also has access to a third hardware group – digitizers, plotters and map production facilities – through arrangements with other agencies.

Although the hardware components are located in different areas, this approach eliminates duplication of existing equipment, expertise and other state resources, thus saving considerable expense.

Software for the Eclipse includes Fortran, RPG II for report generation, Hasp workstation emulator for communications to the IBM system and the Infos data management system.

A variety of packages is available throughout the whole system, including Nips software, the Statistical Analysis System (SAS), Polyvert for land use mapping and an econometric software package (ESP).

Equally important to CPIS is its data. There are currently four permanent files: land inventory, soils inventory, population and housing census and economic status. Other major files include employment and unemployment, industrial development and public assistance. Minor files vary from time to time.

"Gathering all this data required coordination with and cooperation on the part of agencies," Mayer said. "First we had to identify what we needed, then write programs to extract and reformat the data so it would be compatible with our other holdings," he added.

A key part of CPIS is the subsystem which gives researchers an up-to-date list of all holdings in the state planning library. The catalog of all resources – books, pamphlets, periodicals, studies, maps, photographs and microfiche – is stored on the Eclipse system. Infos allows entries to be accessed by author, title, code number, Library of Congress number or subject.

Access is on-line through the system's CRT and a hard-copy bibliography is printed out periodically. The library system is structured so that it can become a pilot project for a possible future data directory of all holdings in the state.

Relational Approach Adapts to User's Aims

(Continued from Page S/10)

perienced mathematicians, were decidedly 'turned off' by the terms 'ntuple' and 'domain,' " words labeled "confusing and ominous terminology" at another point in the paper.

"Replacement of these terms by 'row' and 'column' greatly expedited communication with new users," they added, in what is surely the understatement of the entire paper.

From simple thoughts, it is relatively easy to lead new users into understanding that in addition to a table being a repository or collection of data it also represents relationships among the data items in that table, the paper continued. Once that understanding is achieved, the "rows" and "columns" of data can be put into new tables, providing new insights into the relationships of the items.

To illustrate this point, the authors noted that one of the areas in a personnel data application in which the relational operators "proved very useful" was in input data validation. "By looking at large clumps of data and groupings items together in various ways, many errors were isolated.

"These validation procedures were not carried out before because of the effort required to write and debug computer programs" developed in conventional ways, they added.

As useful as the relational operators appear to be, however, Joyce and Oliver acknowledged that the graphical and statistical adjuncts to Regis – "which could have been built into any conventional data base packages" – were sometimes seen by users as even more valuable.

Regis contains performance monitoring facilities which continuously record various phases of its operations for the usual purposes of locating inefficiencies and predicting performance as a function of command sequences and data base sizes. The monitoring information is stored in normal Regis sets and thus can later be analyzed from a variety of perspectives.

Concern over efficiency of a generalized approach such as Regis "is still justified," the authors said. However, "use of the system does eliminate the traditional specialized programming effort. We feel this savings has greatly offset any execution inefficiencies" in Regis itself.

Going Data Base?

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- 10:45-12:00 – Panel – The Data Base Future: DBTG, relational, distributed or?
- 12:00-1:30 – Luncheon/Speaker: Leo J. Cohen: The Impact of Data Base on Management's Business.
- 1:30-4:00 – Four Concurrent Sessions

SESSION 1
Review of the Packages;
Review of IMS, Total, IDMS, S2000, ADABAS, DATACOM

SESSION 2
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Jury Still Out

Memphis Schools Ponder Wisdom of DBMS Acquisition

By Betty Stanley
And Jack Merrill
Special to Computerworld

In the fall of 1972 the Data Processing Division of Memphis City Schools decided to use data base. This was one of the most difficult and thoroughly debated policy decisions the division has faced since the decision a decade ago to acquire an IBM 360.

Has the experience justified that decision or has the effort been more trouble than it is worth? The jury is still out on a definitive answer.

There are now 10 files in DL/1 format and 300 programs which work with them. The main motivation was to make changing and adding to files less costly in programming.

Six people work on maintaining 1500 Cobol programs. The demand for their services could keep at least 12 people busy. The effort involved in converting to DL/1 is adding to the work of the maintenance team.

What is not so easy to measure is how much maintenance (and evolution of small improvements) is less costly because of the files and programs which now use data base. A comparison of the present structure of several major files with their original data base design indicates the flexibility is advantageous.

Film Schedules

In the fall of 1974 computerized film scheduling was begun for the Division of Instructional Materials. An average of 560 films, with peak loads as high as 1500, are scheduled daily via a TCI 277 CRT attached locally to an IBM 370/135. (There are five additional TCI 277s and one TCI 275 on-line simultaneously running various inquiry and data-entry applications.)

The film records are stored on a DL/1 film master file. This file is composed of a root segment which contains the title for each master film number, one print segment for each copy of the film in circulation, a description segment for each line of the film description and subject segments denoting cross reference information.

Inquiry to the film master causes scheduling information for an entire calendar year to be displayed on the terminal. Scheduling for additional prints of the film can be displayed by depressing a specific key.

Films are requested by completing a preprinted requisition form or by telephone. The master film number, school code, teacher name, use dates preferred and the number of days desired are indicated. The person requisitioning the film is also encouraged to give "not before" and "not after" dates (a range of dates) marking acceptable alternative use dates.

This information is entered on the terminal and the least utilized copy of the desired master film number available on or nearest to the preferred date is booked for the number of days entered, plus one day for delivery, one for pickup and one for cleaning and rewinding.

The DL/1 film master file is updated on-line and a detail transaction is logged to disk for each film booking or extension. If none of the copies of a master are available within the given range of dates, the terminal operator is notified and a rejection record is logged to the disk transaction file.

Requests Confirmed

At the end of the day, this disk transaction file is used to print teachers' confirmation reports which tell them when to expect delivery of the film and when it must be returned. This report also informs the teacher if the desired film was unavailable within the specified range of dates. These reports are sent to the teachers daily.

The file is then merged onto a year-to-date transaction file and the disk space cleared for use during the next day's on-line scheduling. The year-to-date transaction file is used to print daily film delivery and pickup tickets and yearly utilization and rejection reports by school and by film. This enables the Division of Instructional Materials to more effectively assign video equipment among the various schools and determine which filma need more copies in circulation.

A film catalog has been printed from the film master file. A tape copy of the DL/I film description and subject cross reference file was input to an RCA photocomposer.

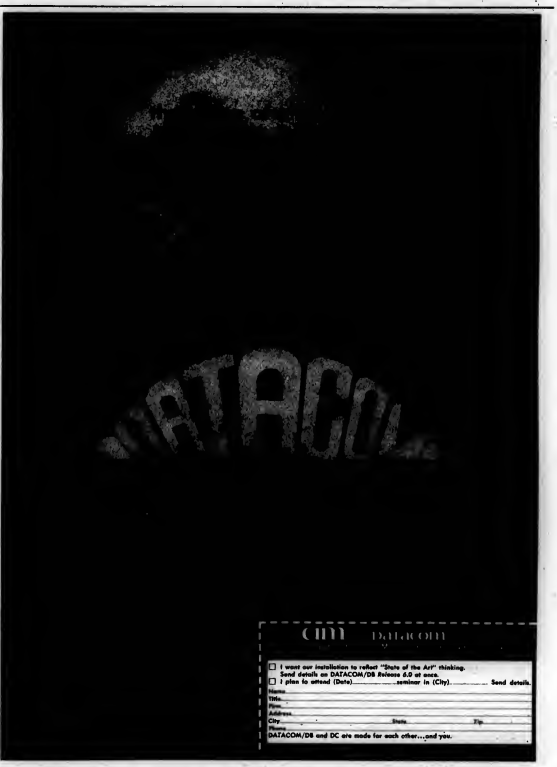
All changes, additions and deletions (including damaged film handling) to the film master are presently being done in a batch job environment, but a feasibility study on providing on-line capability for these jobs is being carried out. All of the software for the film scheduling system was written entirely in house.

In the spring of 1975 there were several requirements which forced a file change in the student master file. After much debate about how to handle these, the decision was made to convert the file and programs to DL/I; the system has been working well for more than a year.

There are advantages and disadvantages to data base. The advantages of data base address the disadvantages of more conventional file to program to device relationships. For those who do not plan to invest much in conversion or program maintenance in the next two to three years, the data base advantages would be less significant. The Memphis schools justified data base in part on the basis of minimizing future conversion costa, regardless of whether they are caused by hardware changes or by systems improvements. The DP division was afraid that DOS/VS and data base would significantly degrade throughput through extra overhead and paging. These fears have not materialized.

There is still much work to be done. All new files are being implemented in data base format and the expectation is that all major files will ultimately be changed to DL/I.

Stanley is a system software programmer and Merrill is director, computer division, for the Board of Education in Memphis, Tenn.



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Univac Software Backs Ohio System

By Giora Baram

Special to Computerworld

The Northwest Ohio Regional Information System (Noris) is an on-line comprehensive Criminal Justice Information System (CJIS) for law enforcement, court and correction agencies in this part of the state. The system runs on a Univac 1100 using TIP/CMS and Univac's data base management system, DMS-1100.

Noris tracks offenders from the issuing of a warrant, through arrest and court proceedings until it becomes a criminal history.

It also interfaces, through Ohio's Law Enforcement Administrative Data System (Leads), with the National Criminal Information Center (NCIC) and the National Law Enforcement Telecommunications System (NLETS) for querying vehicle information and message switching nationwide. Furthermore, the Noris CJIS contains "enhancements" such as soundex, alias names and numbers and weighted search.

Integrity and Security

The system is also designed to provide the integrity of data and security expected from a regional CJIS.

Several modules of the system were transferred from other operational systems in the U.S. under a special grant from the Law Enforcement Assistance Administration which is studying the feasibility of transferring applications rather than "reinventing the wheel" [CW, June 18, 1975].

While the Noris data base is rather complex by its nature, the system was developed and transferred in one year at a cost of about $700,000. The staff at Noris feels this was accomplished because of the DMS-1100.

Baram is deputy director of the Northwest Ohio Regional Information System.

Problems in IMS Implementation Solved by Insurance Company

By Gaylord E. Smith

Special to Computerworld

COLUMBUS, Ohio – In the past three years, Nationwide Insurance, with home offices here has experienced rapid growth in the use of data base/data communications systems.

The first data base was loaded in June 1973 using Cincom System's Total and Environ/1 as data base/data communications software. Increased complexity and growth of applications resulted in a conversion to IBM's IMS/VS in September 1975.

The current size of the Nationwide data base is summarized by application in Figure 1. The processing of auto and homeowners policies is decentralized, resulting in 12 data bases which are identical in structure. Nearly all are Hidam with secondary indexes. There are no logical relationships.

Currently under development are applications for a claims processing system and a tape library control system.

While things are moving forward reasonably well, there have been several specific problem areas worth noting:

1. Free Space Distribution. This is a difficult problem in IMS/VS data bases. It is important that record keys be designed such that new record additions are distributed evenly across the data base. This was accomplished by loading policy files in terminal digit order. The final three digits in the key are swapped with the initial three digits.

2. Data Base Recovery. Using the image copy/change accumulation facilities within IMS/VS for backup and recovery was too slow. We currently use Innovation Data Processing's Fast Dump Restore (FDR) package and the IMS/VS log tape recovery facilities. All data bases are backed up to tape once a week on Sunday nights.

We have also found we need two ways to recover data base on-line update activity. One way is log tape recovery. In addition, all applications which do on-line updates write user records to the log tape. These records can be used to recreate this on-line activity in a batch mode. This latter technique is a "safety valve" to be used when log tape recovery is not possible because the data base has been altered.

3. Concurrent On-Line and Batch Update. The BMP facilities of IMS/VS are the only facilities for batch updating a data base which is also being updated on-line. If the on-line CPU is running near capacity, the running of a batch job on the same CPU can severely degrade on-line response time.

We have found it necessary to isolate data, in a separate data base, if our plan is to update this data on-line. Specific records must be updated either on-line or in batch mode. They cannot be updated by both batch and on-line concurrently, unless the on-line CPU has excess capacity.

Smith is director of Regional Systems at Nationwide Insurance, Columbus, Ohio.

Application	Data Bases	3350 Packs
Auto	12	16.0
Fire	12	5.0
Life & Health	4	6.0
Commercial	3	.3
Personnel	1	.3
Agent	12	.2
Credit Union	1	.1
Data Dictionary	1	.1
Total	46	28 Packs (8.9M bytes)

Figure 1. Data Bases at Nationwide Insurance

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COMPUTERWORLD

Data Dictionary May Be All Many Users Really Need

By David da Costa
Special to Computerworld

One of the greatest problems in the design of data bases is the accurate prediction of future data requirements. This in turn leads to a confused situation whereby additional data items lead to a disproportionate expenditure of effort and a general degradation both in data base design and performance.

Even successful implementors of data base management systems (DBMS) at some time find it necessary to almost completely revamp the system, to reorganize data and restate the logical relationships between data. (This is exactly the situation that many data bases have been introduced to prevent!)

Because of this, many users who have reached the stage where a redesign is necessary and who wish to avoid the same miserable procedure yet again, have opted to isolate their data base system by means of a data dictionary. This is a software system that handles the management of data, in contrast to the DBMS, which handles the manipulation of the data.

For the same reason more users are implementing a data dictionary before they move into data base systems at all.

With a data dictionary it is possible, having organized the data definitions, for parts of some data base systems to be set up automatically.

Administrative Post

Any DBMS will provide for a high concentration of data which will be shared by many users. Both the concentration and the sharing can produce problems: a new position of data base administrator (DBA) is normally created to manage this new environment.

The DBA can exercise control over the information content of the data bases through the use of the data dictionary. In his security function he can exercise control over the use of the data base through allocation of passwords and access security levels that assign authorizations to use the data.

Because the functions of the DBA pertain to more than the data base itself, the new title of data administrator (DA) has been coined.

The DA, through a data dictionary, can define how the data appears to a user. Through the DBMS he can define how data is stored. This emphasizes data independence, making it unnecessary for users to be involved with the physical data structure of the data base.

Again, it is data relationships which provide much of the power of a data base system. With a data dictionary, the DA has the capability to specify the properties that underlie relationships, and rules to maintain the integrity of values that represent these properties. These in turn permit him to maintain and preserve relationships regardless of technological or other changes in the physical characteristics of data.

Redundancy Reduction

A large part of the justification for a data base – only infrequently fully realized – is the reduction of data redundancy.

Because a data dictionary enables different data definitions for different users to be held against one data item, actual data storage redundancy is avoided even though the data itself may be used in redundant structures.

Data integrity is another significant aim of data base use. Once again, armed with a data dictionary, the DA can monitor storage, modification and the use of data to ensure that the integrity is not compromised. This is because a data dictionary enables him to specify editing, validity and consistency rules.

The independence of the data dictionary enables the data base to be reorganized and rerun as usages, statistics and priorities change – without any disruption to the applications being run.

The disciplines needed to ensure compatibility of use of data by the imposition and enforcement of standards are made available to the DA through the data dictionary, which specifies the intention, meaning and physical characteristics of data.

Because data is kept separated and independent, these standards can be maintained regardless of changes in storage technique and are always aligned with the changing data resource environment.

In addition, use of a data dictionary assists both analysts and programmers in avoiding needless programming and in reducing development time.

Whether a definition is input on-line or in batch mode it need only be input once, regardless of the number of applications which will use it. Thereafter, any control blocks or I/O areas can be automatically generated, with tremendous savings in terms of the clerical effort involved in recoding and repunching cards for each fresh application.

Again, the data dictionary can be seen as an interactive map which tells the DA what data is used where and demonstrates the paths between different items.

With the minimum effort it is possible to create "test" systems from the assembled data definitions. A single definition can be modified to produce a new control block or new I/O code, and a single command is all that is necessary to set up fully documented, usable segments.

It is apparent that the introduction of a data dictionary system will have an effect at many levels in an organization. It will create new tasks, but in return it will reduce the effort required by such activities as systems analysis and design, documentation, coding of programs, creation of test data files and checking and auditing of output files.

Da Costa is managing director of Management Systems & Programming, Ltd., London, England and Cambridge, Mass.

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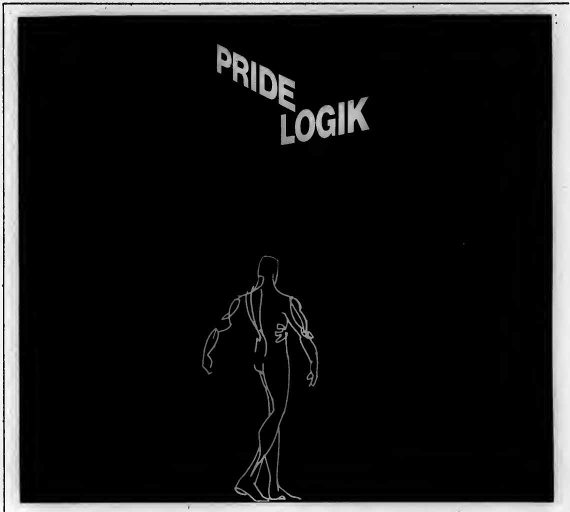

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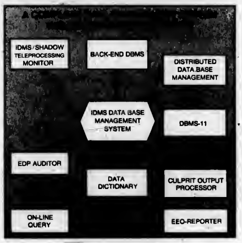
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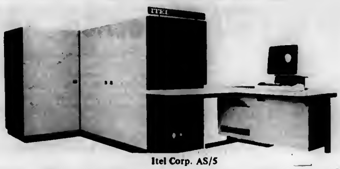

Itel Corp. AS/5

FEC Microfilm System Records Data on Campaign Finances For Open Public-Access Center

WASHINGTON, D.C. – "I think everyone at the Federal Election Commission [FEC] believes open public access is the key to the success of the campaign finance laws," according to Kent C. Cooper, chief of the FEC public records section.

The FEC, which recently unveiled a turnkey system to monitor federal campaign spending [CW, Sept. 27] is using a microfilm system to get the information directly to the public.

"When candidates and special interest groups know their records are open to the public, they react," Cooper said. "Reporters and opposing candidates can bring inconsistencies and questionable contributions into public view even though they may not be technically illegal."

To provide this open access to campaign finance information, the FEC has opened a storefront public records room in downtown Washington where anyone can view the information in its files.

Help-Yourself Operation

The storefront is a no-questions-asked, help-yourself operation, Cooper noted. "We don't care who comes in or what they're looking for," he said.

"We have four staff people to help the public learn to use the files and cross-check the information submitted. But we never ask anyone for identification or question a person about what he or she is looking for," he added.

Such anonymity is essential to investigative reporters and the staffs of oppoaing candidatea, Cooper stated. But establishing an information system with this degree of open access hasn't been easy, he noted, adding that without microfilm it might have been impossible.

The FEC is legally required to make public all reports it receives within 48 hours. At the close of a reporting period, the FEC may receive reports of varying lengths from thousands of candidates and political groups.

Since, it would be impossible to duplicate and file that many documents within 48 hours, the FEC films them with an Eastman Kodak Co. Recordak Reliant 700 microfilmer, which can handle 200 document/min, Cooper said.

The exposed film is picked up by messenger and taken to a processing lab in Baltimore, Md. The film is processed overnight, duplicate copies are made and the microfilmed reporta are returned and ready for public viewing early the next morning.

Having the reports on microfilm has eliminated worries about lost, stolen or misplaced documents, Cooper said.

"Can you imagine the uproar that would result if a reporter couldn't find a candidate's report and filed a story that the candidate broke the law, when the report was simply misfiled?" he asked.

"We can guarantee the accuracy of microfilm file. We couldn't with paper records."

Although FEC files contain more than one million documents, a specific report can be located with the aid of a computerized index. Information extracted from campaign documents is fed into a computer which prepares and updates retrieval indexes.

For example, the 1976 Senate candidate index lists in alphabetical order all candidates seeking a Senate seat, Cooper said.

Next to each candidate's name appears information on the type of report filed, the covering period dates and the number of pages in the report along with the microfilm magazine number and the beginning image number for that document, he explained.

There are similar computer-prepared Indexes for House and Presidential candidates and for special interest groups and political committees which also are in microfilm magazines.

To find a document, a user inserts the

(Continued on Page 38)

Modularity Provides Key To Itel Advanced Systems

By Eather Surden
Of the CW Staff

NEW YORK – A second look at the Itel Corp. Advanced Systems (AS) introduced here recently [CW, Oct. 18] revealed modularity as a key feature.

The CPU, for example, is microprogrammed to allow future enhancements to the system to be more easily accommodated, Itel said.

An operator has the capability to dial out failing increments of memory, a process Itel claimed can be accomplished with no degradation of processing power.

The CPU also features spare multiplexer channels which can substitute for a failing block or byte multiplexer channel, Itel noted. Thus the AS/4, AS/5-1 and AS/5-3 each feature seven multiplexer channels – six standard and one spare; the AS/4MP, AS/5-1MP and AS/5-3MP each have 14 channels including two spares.

Three Physical Areas

Each AS is divided into three physical areas. The back of the unit contains the power and distribution system, power supply and main storage. In the middle of the system, the logical sections for the I/O devices, storage control unit and CPU are located. The operator area at the front of the system contains the CRT, light pen and 180 char./sec matrix printer.

The light pen is provided "because the systems are IBM-compatible. They have a light pen and so do we. It's used in responding 'yes' or 'no' to a question," an Itel spokesman explained. The CRT also has a console keyboard, he noted.

The service processor is housed within the system console. Operating under microcomputer control, diagnostics are implemented through a floppy disk drive, the company said.

The floppy drive would only be run with field engineers present, the spokesman noted.

Within the system's middle section are air-cooled gates which swing out for service. Each gate has its own air-flow source which continues to operate even when the gates are open, the firm claimed.

Many of the boards, which consist of unpluggable components, have empty space for future expansion, the firm noted. An extra section is reserved for future boards.

The repluggable parts capability means users can keep replacement parts in stock, eliminating the need for "high-cost boards to be stored in remote locations," the company said.

The systems weigh about 63% of their IBM counterparts, require 45% of the power and generate 37% of the heat, Itel claimed. The reduction in weight and power consumption can be attributed to high-density bipolar semiconductors which use emitter-coupled logic, according to the firm.

Upward expandability at the user site is another feature that differs from the IBM systems, Itel said. Users reportedly can upgrade from the smallest system to the largest system without exchanging CPUs.

Customer Service

Customer service for the systems will be provided by a division of the firm. Itel is assuming all hardware and software support responsibility except in the program products area.

Those products which are licensed from IBM should be supported by IBM, the spokesman noted. As far as system software is concerned, Itel is assuming responsibility to get the user's system running if bugs develop in the operating system, he added.

Both hardware and software service will be accomplished through a beefed-up field service force. Itel pointed to its Field Engineering Division with more than 500 trained field engineers and said this will be augmented by system engineers.

Initially the firm expects to provide users with four personnel per system, the spokesman stated. "The overall responsibility for hardware and software will lie with Itel," he said.

When asked what program support IBM would supply, an IBM spokesman stated "programming support for system control programs is provided to IBM customers through the Field Engineering Division. However, field engineering (on a per-call basis) and central programming services are not available when such programs are used on non-IBM CPUs."

Slower Cycle Times

Itel admitted its read/write cycle times are slower on the AS than on the comparable IBM systems, but said this is offset by the systems' capability to fetch 16 bytes at a time compared to four or eight on the IBM systems.

The read cycle times for the AS/4, AS/4-MP, AS/5-1 and AS/5-1MP are 1,035 nsec while the write cycle times are 690 nsec, the firm said. The AS/5-3 and AS/5-3MP have a read cycle time of 920 nsec and a write cycle time of 690 nsec, the company said.

"Instruction time will be equal to or faster than IBM instructions depending on whether the instruction is in microcode," the spokesman said.

The CPU has the same internal features as the IBM 370/158, he added, but with the addition of a prefetch function which speeds up effective CPU times.

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To Prevent Unnecessary Downtime

Fire Detection Methods Crucial to CPU Protection

By H. Lein

Special to Computerworld

A relatively small fire in a computer area can cause a disproportionately large loss of irreplaceable time quite apart from the physical damage done. Lost business and downtime are difficult to justify when modern methods of early warning detection are available to prevent their occurrence.

There are a number of fire detection products for computer rooms on the market. They work on several distinct principles; each has its own variables and its own niche carved out in the field of fire detection.

It is impractical and unwise for a user to decide on a system without looking very closely at the details of the particular situation – from the broad picture of building size and configuration, intended usage, value of building and contents and degree of safety.

Frequently, it may be wise to specify the necessary degree of fire protection and let the equipment manufacturers or distributors prepare their bids, offering the engineered systems and equipment mix they think best to meet the situation.

Fire Hazard Development

A fire hazard may develop when a circuit arcs because of loosened terminals, faulty contacts or circuit malfunctions. Many fires originate from other types of fuel loading such as furnishings, paper, accumulated debris in underfloor areas and draperies. These hazards should be evaluated and treated accordingly.

Because the thousands of electrical components generate heat, large air-handling systems are required to keep the equipment at a constant temperature. Sustained temperatures in excess of 140°F can cause malfunctioning of some parts within the system.

Temperatures over 185°F can permanently damage transistors and diodes. Temperatures from 300°F to 500°F can impair reliability of system units. The smoke and acids produced by fire adversely affect operation of computer equipment and magnetic components.

Fire resulting from an electrical fault can be extinguished by shutting off power to the equipment if the fire has not reached the self-sustaining stage.

Ionization detectors can warn of fire before the computer is seriously threatened and indicate an incipient fire condition by sensing invisible products of combustion: particles less than 39 millionths of an inch in diameter.

Ionization detectors, responding to combustion products, are capable of detecting fire before there is smoke, flame or appreciable heat.

Location of Detectors

The spacing of detectors primarily depends upon the number of minutes per air change, air velocity and the number of return grills.

If the air is introduced into the room through a perforated ceiling, a blanket of air will be created along the ceiling, preventing the combustion products from reaching the ceiling. This delays detection considerably.

In such a case, the holes in the ceiling should be sealed off within a 9 sq-ft area around the detector. This usually has little effect upon the distribution of air in the room and considerably improves detection capabilities in the area.

Air Movement

Where there is a significant air movement along the ceiling, the detectors should not be recessed into the ceiling, but rather surface-mounted on the ceiling to protrude into the area. This is necessary since the air movement along the ceiling in a computer room may cause significant stratification which can prevent the combustion products from reaching the ceiling.

The concealed spaces created by a raised floor and hung ceiling present a distinct fire hazard and also require protection. A qualified technician should examine the area for any significant air movement before suggesting the exact detector coverage required.

Protection should be provided for the ventilation system as well as the general and concealed areas. To prevent the spread of a fire condition, ventilation system fans and fire dampers should be automatically shut down when fire or smoke is detected.

Equipment Protection

Electrical faults cause more large-loss fires (exceeding $250,000) than any other cause. In all fires below this figure, electrical faults figure as the third leading cause of fire loss.

The largest factors in initiating electrical fires are motors, electrical wiring and heating equipment.

Equipment protection as differentiated from area protection means the degree of protection necessary to spark an alarm in specific pieces of equipment in order to minimize damage.

It should be emphasized that placing detectors in a normal manner on the ceiling of rooms containing equipment will not assure warning of minor faults, such as burned out transformers and tape drive motors.

Protecting Enclosed Equipment

Two methods may be used to protect specific enclosed equipment.

Where ventilating air is forced and the velocity exceeds the limits allowable for a standard flush or surface mounted detector, the problem may be considered the same as that for an air-conditioning system.

If equipment in need of protection is not housed in an enclosure, it may be necessary to build one. In certain cases, this may not be practical if the equipment must be regularly maintained or if belts, cables or other working parts make enclosure impractical.

In these cases, it may be desirable to build a hood over the equipment so the products of combustion can be collected

(Continued on Page 37)

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Notes and observations from IBM which may prove of interest to data processing professionals.

The brass foundry is one of more than 100 separate work zones at Price Pfister monitored by the online production control system.

It's a DL/1 World at Price Pfister

When the Price Pfister Brass Manufacturing Company moved its "chained" data files to Data Language/1 or DL/1 recently, it also moved into a new world of flexibility and economy of operation.

And for the Pacoima, California, company, it was a move that has made a world of difference in controlling manufacturing and distribution operations to help maintain profit and customer service levels.

Price Pfister is a subsidiary of Norris Industries, Inc., and a major supplier to plumbing wholesalers and contractors, with a nationwide network of five regional warehouses. Its catalog of fittings, faucets and fixtures contains some 4,000 finished items—which incorporate 10,000 separately identified parts and subassemblies.

At the company's headquarters facilities, order entry and production and inventory control are handled online by an IBM System/370 Model 145, using 3277 Display Stations for direct entry of orders and shipments. At four remote warehouses, data is entered through 3735 Communication Terminals.

"Under DL/1," says Joel Brust, director of information systems, "we can easily add a new data field or change the data structure in other ways without affecting any of our 1,100 sales and manufacturing programs except the ones that directly use the revised data.

"In our online order processing system, for example," Brust continues, "we can tailor the content and format of the 3277 display to suit our needs. One feature we've added to the system is order inquiry by the customer's own order number as well as by name; this has proven to be very helpful in getting the right answer to the customer, fast."

DL/1 will enable Price Pfister to maintain a complex file structure that relates every finished item to all its parts and subassemblies, and—in the other direction—each inventoried part to all the finished items on which it is used. DL/1 is an IBM program that organizes such "chained" files, and permits user programs to access the data through a simple interface.

Price Pfister converted to the 145 in October 1975, and at that time started to shift its chained files from DBOMP (Data Base Organization and Maintenance Processor) to DL/1. "The 145 easily handles DL/1 and teleprocessing under CICS/VS (Customer Information Control System/Virtual Storage)," Brust says, "and the increased capacity permits us to do material requirements planning and production scheduling on a weekly cycle, rather than on a monthly one.

"The online system continuously tracks some 11,000 items of work-in-process inventory through 100 work zones. By revising the production schedules weekly, we've been able to hold down inventory imbalances and avoid uneven loading of the work centers. Switching to a weekly cycle enabled us to cut work-in-process inventory by six percent."

Putting the Computer Where the Users Are

Interactive computing is making data processing and problem-solving power directly accessible to end users and programmers alike. End users can engage in personal computing to solve specific business, financial, engineering, design or similar problems. DP professionals can work interactively for faster creation and testing of programs.

And with facilities now available from IBM, interactive computing is easy to use, powerful in developing solutions, and adaptable and economic to implement.

End User Computing

For the end user—the financial planner, engineer, marketing specialist—personal computing provides simple procedures for using the computer to solve spur-of-the-moment or one-time problems. Each user gets his results promptly at his terminal.

A financial planner can make cash flow projections. A marketing man at a terminal can structure a new type of sales analysis for a sales program. An engineer can solve an equation or try alternative approaches to a design problem, working creatively and interactively with the computer.

A computation can be of any size. Applications which are too small to put through the program development cycle may be entirely feasible when implemented directly by the user.

For the user who wishes to solve unique problems, three user-oriented IBM languages are easy to learn and simple to use at a terminal (see box). And a constantly growing set of IBM prepackaged interactive programs supports such applications as economic analysis, simulation and modeling, statistics, forecasting, project management and data base access.

Developing Applications

For the programmer, interactive computing provides a new level of productivity. He can submit programs for test directly and receive results back promptly. Working interactively, he receives immediate indication of any coding errors rather than, as in the past, waiting to obtain a test run.

DP managers have found that interactive application development has greatly increased productivity. At Playtex Inc., for example, programmers who had been putting an average of seven lines of code per day into final form were able to produce 70 final lines a day. This significantly shortened application development time, and the resulting programs proved more reliable and easier to maintain.

Use of interactive computing by professionals throughout the organization relieves the programming staff of work which users can now do for themselves, and greatly reduces the cost of developing small or occasional-use programs.

At the same time, this use of personal computing frees programmers to focus on more demanding, production-oriented applications. Similarly, computer operators are relieved of queuing the unscheduled jobs, which users can now enter directly, and of delivering printouts of results which can be received directly at the terminal.

With interactive computing, the organization and its people make use of the full power of multiprogramming. Professionals can access the system simultaneously without interfering with ongoing batch or scheduled work. Programmers can increase productivity. And both can develop new approaches to the computer and better understanding and use of its potential.

IBM Facilities for Interactive Computing

Three IBM languages are designed specifically for problem-solving under Virtual Storage Personal Computing (VSPC):

1. *VS BASIC*. Powerful, yet simple to use, it is adaptable to a wide range of business and general applications.

2. *VS APL* is a broadly applicable interactive language particularly well suited to the creation of business and commercial programs.

3. *VSPC FORTRAN* is an interactive version of FORTRAN, the established language for mathematical and scientific programming. It is designed specifically for use under VSPC.

Professional programmers using IBM interactive computing under the Time Sharing Option (TSO) or the Virtual Machine/Conversational Monitor System (VM/CMS) for application development may work in any of the standard IBM programming languages: COBOL, PL/I, FORTRAN, APL, RPG II, or Assembler.

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New Techniques Aid John Hancock Programmers

Two years ago, John Hancock Mutual Life Insurance Company became one of the first users of the Improved Programming Techniques. Now it is reaping benefits in more orderly application development, program quality and maintainability, lower development costs, and schedule adherence.

"We find the six techniques to be synergistic," says Robert C. Volante, vice president for systems and programming. "You get the most benefit by introducing them early in program development—at the level of analysis and design—and all together."

Using the techniques, each development step is a group operation rather than an individual activity. One of the techniques is *Team Operations*, under which a project is organized into groups, each with a chief programmer, a backup programmer, and a team librarian who keeps track of source code and manages documentation.

During *Top-Down Development*, detail program design and coding proceed from the top or control portions of the program down to the finest levels of detail. Under *Structured Programming* certain architectural forms are adhered to in writing the program, making it more regular in form and simpler to read and interpret.

A program is developed as a group product, "publicly owned" rather than proprietary to individuals, by conducting *Structured Walkthroughs:* formal group procedures for verbally analyzing and validating programs and modules.

"You see the real beauty of these methods when a specification change pops up half way through a major project," says Volante. "When the customer asks for a change, we can rapidly find every affected point in the system with a look at our HIPO diagrams and structured code." *HIPO* (Hierarchy plus Input-Process-Output) *Documentation* is used to describe small, functionally defined modules, serving first as a tool for design of the program and then as permanent documentation.

"Our users are happier too," Volante says. "One, after attending a structured walkthrough, told us: 'Now I understand what I'm getting before the system is installed.'"

Notes Nancy Bern, director of EDP education: "The intrinsic discipline of the walkthrough," she adds, "prevents errors. People get oriented to doing the job correctly."

The *Development Support Library* and the team organization, Bern says, relieve programmers of clerical work, making better use of their time.

EDP education at John Hancock is directed by Nancy Bern (right), assisted by senior instructors (left to right) Cindy Gasik, Jack Grady, Ted Pierce and Dan Steele.

"When IBM presented the techniques to us in early 1974," Volante says, "there was an intuitive reaction here that this addressed important issues for us. We started people through the two-week IBM course on the techniques, and launched three pilot projects.

"Two of the projects are now complete," Volante continues. "In spite of the 'learning curve' effect, they were finished within our time and cost estimates. But the real benefits came in testing and maintenance. With top-down design and programming, integration testing proceeds in parallel with development. We find that our systems are better tested, and that new programs run correctly from the start.

"About 60% of our programmer-analyst time goes into maintenance," Volante says, "and the techniques are especially helpful there. Programs are easy to read and people have little trouble picking up one another's work.

"Once people get accustomed to the methodology," he adds "they don't want to go back. We've now trained 200 EDP people and more than 50 end users, and the people who haven't been through the course yet are eager to go. Now we've moved up on the learning curve, and projects are beating their schedules."

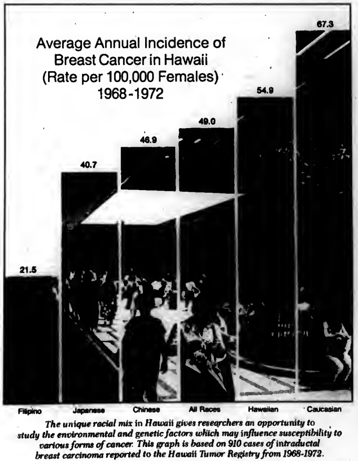
There are about 12 projects in various stages under Improved Programming Techniques, he says, including a very large online system. "Our efforts have really paid off," he asserts; "we won't turn back."

Computerized Data Base Aids Cancer Researchers in Hawaii

Is there any relationship between a woman's height and weight and the possibility that she may contract breast cancer? Or between racial origin and the tendency to get a specific form of cancer? Could diet or occupation have any influence on a person's susceptibility to cancer?

These are all questions currently being researched at the Cancer Center based at the University of Hawaii. Scientists and doctors trained in a wide range of disciplines including biology, chemistry, genetics, epidemiology, biophysics, immunology and virology are studying the correlation among many factors which may be related to causing cancer.

The Center, funded largely by the National Cancer Institute, maintains a large computerized data base stored in the University's IBM System/370 Model 158. It includes information such as the birth and marriage records and ethnic backgrounds of over 200,000 families living in Hawaii.



The unique racial mix in Hawaii gives researchers an opportunity to study the environmental and genetic factors which may influence susceptibility to various forms of cancer. This graph is based on 910 cases of intraductal breast carcinoma reported to the Hawaii Tumor Registry from 1968-1972.

Many Factors Involved

"We begin with the belief that there is more than one condition which can influence susceptibility to cancer," explains Dr. Lawrence H. Piette, Director of the Cancer Center. "These conditions may include exposure to or the presence of a specific virus, the existence of a particular carcinogen in the environment and/or a genetic predisposition to the disease. Any one of these factors alone will not necessarily cause cancer, but in combination they are more likely to increase the probability the disease may occur."

Hawaii provides an excellent "laboratory" for studying cancer because of the unique racial mix of the population. Data collected by the Tumor Registry program, part of the state's Department of Health, indicate that the seven major racial groups in Hawaii—Japanese, Filipino, Chinese, Korean, pure Hawaiian, part Hawaiian and Caucasian—have different incidences of cancer at different ages, despite the similarity of environment.

Heredity or Environment?

"We want to determine the relationship between the environmental and genetic factors in connection with the disease," says Dr. Piette. "For example, we know that the incidence of breast cancer in Japanese women who have migrated to Hawaii is higher than for those who have remained in Japan. On the other hand, the propensity of tbe offspring of Hawaiians of Chinese ancestry to get a rare form of cancer called nasal pharangeal carcinoma seems only slightly affected by environmental change. In both cases, we'd like to find out why, now that we have identified broad correlations."

For instance, the data base has been used to test the validity of the hypothesis that women who are taller and heavier relative to the average for their race show a higher risk of getting breast cancer. First postulated by a team of Dutch researchers, this theory appears to be substantiated for the women whose records form the Hawaiian data base. However, Dr. Piette cautions that simple correlations only tell part of the story. Many other factors, such as the age of a woman during her first pregnancy and her estrogen profile, may also be very significant in determining susceptibility to breast cancer.

"We were fortunate that Hawaii already had good record keeping programs," says Dr. M. P. Mi, a geneticist and director of data communications. "Our goal now is to incorporate additional kinds of data such as blood type and fingerprints. Most people aren't aware that fingerprints can help determine racial origin, a significant fact in a population with extensive intermarriage.

"Most of our work is still in the preliminary stages," comments Dr. Mi. "As we move into multivariate analysis—correlating many factors—we will be able to get increasingly specific results. We feel our work can help develop hypotheses which can be followed up in later studies. The more we know about the disease, the better our chances will be for earlier diagnosis by identifying high risk groups and, in many cases, effecting cures."

DP Dialogue appears regularly in these pages. As its name suggests, we hope DP Dialogue will be a two-way medium for DP professionals. We'd like to hear from you. Just write: Editor, DP Dialogue, IBM Data Processing Division, White Plains, N.Y. 10604.

IBM.
Data Processing Division

Installing Fire Detection Units Can Prevent Wasted Uptime

(Continued from Page 34)

and directed to the detector.

In most cases, equipment which develops a fault sufficient to alarm the detector should be automatically stopped or deenergized. The control equipment provides terminal contacts for this purpose.

In some types of equipment, it may not be practical or safe to provide automatic cutoff; therefore, the desires and advice of the user should be considered.

With electrical fires, the smoldering fire continues up to the "self-sustaining point" only by virtue of the electrical energy being supplied.

Therefore, if the system has been designed to detect the incipient fire (such as in direct equipment protection), extinguishment can usually be provided simply by automatically shutting off power to the equipment upon alarm from the detector.

Automatic Extinguishment

In cases where the system is not designed for incipient fire detection or where the possible fuel for a fire would not be extinguished simply by turning off the equipment, automatic extinguishment systems may be desirable.

These systems can be of three types:

- Automatic discharge on alarm from the detector.
- Automatic discharge by an independent heat detection system.
- Manual discharge.

These systems can be carbon dioxide flooding, halon flooding, sprinklers, etc.

Ionization, infrared and photoelectric detectors are early warning devices and, as such, could respond to a fire still in its early stage before the extinguishing system must be discharged. In such cases, portable extinguishers can be used.

'Cross-Zoned'

In order to avoid, as much as possible, the tripping of the extinguishing system except when desired, Pyrotronics, Inc. recommends the use of a "cross-zoned" system. With this arrangement, the area is protected so two separate zones in alarm will activate the extinguishing system. The detectors are alternately spaced in the area.

Protecting a computer with an early warning system means more than merely installing a series of ionization detectors. To operate effectively, ionization detectors must be installed properly – in a correctly designed system; and know-how for system design takes experience.

Lein is a fire protection engineer with Pyrotronics, Inc. in Cedar Knolls, N.J.

'Laser Beam Systems' Focus of Seminar

CHICAGO – "Laser Beam Information Systems" is the topic of a three-day seminar at the University of Chicago starting tomorrow.

Subjects to be covered include "Adapting Lasers to Usable Information Systems" and "Characteristics of the Laser in Information Systems," in addition to applications sessions, a university spokesman said.

The seminar costs $395 per person plus a $50 registration fee, the spokesman added from 1307 East 60th St., Chicago, Ill. 60637.

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Computer systems fail because people do.

Solving the People Problems of EDP Management is a new, two-day seminar that will help you be a better DP manager.

NOTE: Only one seminar before '77 budget time—don't miss it!

Some problems erode the effectiveness of your data centers from the inside. And they're not part of your computer. They're part of your people. The human relations conflicts that surround your operation can sap management time, erode employee confidence, alienate the executive staff, diminish DP productivity — and leave you stuck in the middle. Jack Stone, PhD, has developed a new seminar that's designed to help you improve the performance of your computer center by increasing your ability to communicate with people — from keypunch operators to the board of directors. Its called *Solving the People Problems of EDP Management.*

The Course Work

Using case studies, interactive discussions and workshops, this two-day seminar examines the human relations conflicts that commonly affect most computer centers, and presents strategies and techniques for resolving them.

The seminar is intended to give each attendee a new and practical understanding of the aspirations and motivations of computer professionals. It is designed to help DP managers communicate more effectively with senior management, and develop more positive relationships with end users and other people outside the data center. This includes the development of a "public relations" program for DP center, with the object of increasing end users' understanding of how the computer center can help them in their jobs.

Here are just some of the things you will learn:

- How to improve performance among operations personnel, despite typically poor attitudes.
- How analysts and programmers have a different view of their jobs than management, does and how to handle the resulting conflicts.
- How to replace "management by crisis" with "management by plan."
- How to increase the people-productivity of your DP center and thereby make it more useful to your entire organization.
- The pros and cons of structured design and programming management techniques.

Jack Stone, PhD, is the Seminar Leader

Jack Stone, PhD, is managing director of Computer Education International, Inc., and is recognized for his abilities as an author, educator, and consultant to EDP managers. A Phi Beta Kappa graduate from Princeton University, Dr. Stone has been involved with computers and electronic systems for over 23 years, including 8 years as a Manager at IBM, where his responsibilities included development of instructional Systems, as well as management of a DP center; and 7 years as a principal in several independent firms supplying management consulting and training services to large computer centers. He is a member of ACM, DPMA, AMA, and the American Society for Training and Development. Dr. Stone has contributed many articles and columns to *Computerworld* on the subject of EDP human relations, and presented a paper at NCC '76 on "ADP Training Systems." He is currently preparing his first book for publication, which deals with human relations in medium-to-large computer centers, and these works will form the basis for the extensive materials you'll receive in the course.

Charges and Enrollment

The charge for the entire 2-day seminar including continental breakfasts, luncheons and all course materials is $295* per registrant. Additional registrants from the same company get a $35 discount, and pay only $260*. This does not include hotel rooms, if necessary, but we have reserved a block of rooms at the seminar hotel for attendees who wish them. To enroll, look over the schedule below, fill in the coupon and send it in. Remember, enrollment is limited and no space can be firmly held until we have received check or purchase order.

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* This seminar is also available for private, in-house presentations. If you have several people who could benefit from this training, it may be cost-beneficial to have Dr. Stone present the seminar to your staff exclusively (the seminar can be tailored to your specific needs).

☐ Check here for more information

Customer Checks Banked in 24 Hours

On-Line Cash Application Perks Up Firm's Cash Flow

By William E. White
Special to Computerworld

BROOKLYN, N.Y. – A typical customer at Peerless Importers, Inc. here makes purchases four times a week. He sends us a check every week that may cover all or some of what he bought that week, include prior purchases and reflect discounts, charge-backs and other factors.

That check is just one of more than 2,400 we receive every day from over 15,000 customers in the metropolitan New York area. It is banked within 24 hours of its arrival – and probably the same day it is received.

The capability of efficiently handling this heavy cash flow is provided by a computer-based system developed specifically to meet our requirements. The productivity of accounts receivable clerks handling this work has been greatly increased, customer relations have been significantly improved and, in financial terms, the system paid for itself in the first year of operation alone.

To our knowledge, this is one of the first on-line cash applications anywhere. Three clerks at terminals linked on-line to an IBM 370/135 handle a workload that previously occupied seven people and frequently saw incoming checks held up from three to seven days before they could be banked.

A significant amount of money is being saved in interest charges for money that would otherwise have to be borrowed to finance our accounts receivable.

Peerless Importers, founded in the early 1940s, is one of the largest liquor distributors in New York. Over 300 salesmen service customers out of four divisions: Peerless, Alpine Wine & Liquor, Webster Lawrence and Ferrara Wine House.

A mechanized warehouse adjacent to the company's office stocks between 5,000 and 6,000 items, assembling shipments and loading trucks overnight to fill the 2,100 orders that come in every day.

Peerless' experience with DP dates back to 1950, when an IBM 403 accounting machine system was installed. Computer operations began in 1963 with a 1440, upgraded successively to a 360/20 and 360/22.

Replacea Stuffed Trays

The cash payments application problem began to build up in the early 1970s. Incoming checks were stuffed in trays with punched cards representing bills outstanding.

Cards and checks were pulled and manually compared for multiple payments, discounts and credits. The seven clerks worked overtime every night, almost every Saturday and even on holidays on which there were mail deliveries.

Despite this effort, checks did not get to the bank until at least two days after receipt – and in some cases not for seven to 10 days.

Since we could find no ready-made program package for an on-line cash application, we contracted with IBM's Systems Engineering Services to develop it for a one-time fee. We estimated three clerks would be needed, each working at an IBM 3270 CRT terminal.

This original projection was met, and on-line cash went into operation in September 1973. A fourth terminal was added later in the credit department to answer customer inquiries and to make fast credit checks.

Adding Machine Control

The 370/135 includes disk units with 174M bytes. Housed in these units is an accounts receivable data base with all open bills by customer number, date of delivery and amounts due.

As the checks with bill stubs come in, they are batched in groups of 20 or less, and an adding machine total is run up as a control figure. The batches go to an accounts receivable clerk who enters the customer number into the terminal.

The clerk then enters the amount of each check in the batch and the control figure. If these do not agree, the system does not accept the entries and the clerk has to correct the error before continuing.

Once the information has been accepted, the system applies the cash payments in those situations that can be handled automatically – when the check is for a single invoice, a single statement or when it covers all open bills in the file.

After all batches are entered and the payments that can be handled automatically are applied, the clerk is left with those situations that require intervention. A batch number is entered, and the first check that was not resolved appears on the screen. The system also lists all of that customer's open items.

The clerk scans the list of items to find any combination of two or more that may add up to the amount of the check. The clerk touches each open item with a light pen; the system adds them and shows the total and any difference between that total and the check amount.

In this manner, the clerk interactively resolves any partial payments, chargebacks, returns or credits.

White is DP manager at Peerless Importers, Inc.

Microfilm Operation Gives Public Access To Campaign Data

(Continued from Page 33)

appropriate microfilm index in a Recordak Microstar reader/printer; finds the name of the candidate or committee and notes the microfilm magazine and image number for the desired report.

The user then inserts the proper microfilm magazine, keys in the frame number on the image control keyboard and pushes a search button; the document automatically appears on the screen.

At the push of a button, the user can get a paper copy of the document to take away and, at the same time, the microfilm file remains intact for the next researcher, he noted.

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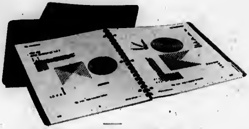

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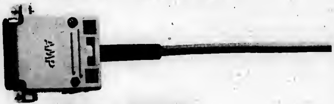

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Mini Bits

West Coast Conference Set For Home Systems Users

WOODSIDE, Calif. – What may be the "first West Coast Computer Faire" concerned with both personal and home computers will be held in San Francisco April 15-17.

The Faire is being cosponsored by a variety of organizations including the San Francisco-area chapters of the Association for Computing Machinery, some personal computer clubs and some educational institutions.

The conference portion of the Faire is expected to offer some 100 tutorials, informal presentations, formal papers and discussion sessions. The exposition will feature a variety of "homebrewed" personal systems and low-cost components.

Suggestions for speakers, topics, papers, exhibits and special activities should be directed to Jim Warren, Faire Chairperson, Star Route Box 111, Woodside, Calif. 94062.

Century Series 400 Expanded

CONCORD, Calif. – Century Computer Corp. Series 400 business systems can now accommodate 512K of MOS memory rather than the 64K previously available, according to the company.

The expanded memory circuitry can be added to systems already in the field for $1,500 and is available on current systems for $1,000, the firm noted.

Memory modules in 32K increments cost $7,500 up to 128K and $6,600 thereafter, a spokesman added.

The expanded memory systems were designed for heavy multiprocessing and on-line/real-time applications, he noted from 2339 Stanwell Circle, Concord, Calif. 94520.

Adapso Plans New Jersey Seminar

NEWARK, N.J. – A two-day seminar sponsored by the Association of Data Processing Service Organizations (Adapso) will "review the opportunities available to data centers as a result of the small business computer" on Nov. 9-10 here.

The seminar will cover a basic introduction to minis and small business systems, types of vendors, business problems that can be solved by the small systems, implementation and how to get into the business and stay in, a spokesman said.

The seminar costs $110 for Adapso members; and $200 for nonmembers. Information is available from Adapso at 210 Summit Ave., Montvale, N.J. 07645.

In Trying to Get Files On-Line

Fingerpointing Vexes Mixed-Vendor Site

By Esther Surden
Of the CW Staff

YELLOW SPRINGS, Ohio – Cooperation was definitely not the keyword when a mixed-vendor shop here with an IBM 3/10 attempted to get all of its files on-line, according to its assistant DP manager, Keith Swigart.

Yellow Springs Instrument Co., Inc., a medical electronics manufacturer, has a 3/10 with 8K bytes of IBM memory, 40K bytes of Business Systems Technology, Inc. (BST) memory, a 200 line/min IBM 5203 printer, four IBM 5444 drives with 2.5M bytes each, two BST 5445 drives with 20.48M bytes each and a 250 card/min reader.

The system is running Cincom Systems, Inc.'s Total data base management package.

The problem began when the firm, which runs simple accounting functions on the system, found it was constantly changing disk packs because all the files could not be kept on-line, Swigart said.

"When we set our files up, we set them up so each of the applications that had a related file was a [separate] file. Consequently, we've run out of file space. We have in the vicinity of 125 to 150 files and are still growing," he explained.

"Most shops using a small system try to work with the 2.5M-byte disks. We did too in the beginning, but we saw it was taking too much time to change packs to run different jobs," he said.

"Our reaction was to say, 'We're wasting too much time each day on pack changes. Why don't we try to put all our programs in one library pack and all of our files on one file pack?'

"Then, whenever we wanted to run a program, all we'd have to do was run the program.

"Only it didn't work that way," he recalled.

Vtoc Limitation

Yellow Springs bought the two BST 5445 disks and changed all its files over to the disks – and then found out there was a 50-file Volume Table of Contents (Vtoc) limit for the 3/10, Swigart said. A 3/15 can handle a 1,000-file Vtoc on the same disks, he indicated.

Swigart called IBM and was informed a 1,000-file Vtoc could not be accommodated by the 3/10 because the system handled data differently than the 3/15.

IBM also said the limitation was noted in the system manual, but Swigart and his staff have yet to find it, he said.

Swigart then got in touch with the IBM regional supervisor. The supervisor gave him the number of the president of Common, a small systems users group, and told him Common was accustomed to handling such problems, Swigart said.

The conversation with Common resulted in Swigart being pointed to a package from Group 3 called Extend which he said "goes in and modifies the supervisor; [the vendor] didn't tell us it was going to change the supervisor."

Trying that package was disastrous for the firm, he added. "Odd things kept happening, like we'd lose a record in the middle of a run or a record would pop up out of sequence."

The "solution" brought the system to a crashing halt – "We were down and couldn't process anything. The files just weren't there."

So Yellow Springs called IBM back and said it was having trouble with the supervisor. While IBM admitted there might have been a problem with the supervisor, it also pointed out Yellow Springs was running another vendor's software on the system, he said.

The firm also called the software vendor, which claimed all the other Extend packages in the field were working well and the problem had to be in the IBM

(Continued on Page 42)

BSP Has Multiterminal Systems For On-Line, Interactive Users

IRVINE, Calif. – The Adviser systems introduced here recently by Business Systems Products, Inc. (BSP) were designed to span the range from first-time user applications to sophisticated distributed processing, according to a company spokesman.

The two multiterminal, on-line interactive hardware/software systems can be operated by a firm's existing personnel, BSP said. The Adviser II and Adviser III systems provide interactive retrieval, data entry, updating and reporting and can communicate to a larger CPU through protocol emulation, the spokesman added.

Users can upgrade from one system to another by adding memory and peripherals; all software is compatible, he noted.

The basic Adviser II includes a CPU with 64K bytes of core memory, a four-port terminal multiplexer, 10M-byte disk drive, CRT utility table and 100 char./sec matrix printer.

The system operates under the Adviser Virtual Memory Operating System (Avos) which supports 24 interactive applications, a batch utility, communications emulator and two spool-to-printer tasks.

Adviser II is programmed in the Adviser Business-Oriented Language (Abol), a Cobol derivitive, the spokesman noted.

The Adviser II can be expanded to accommodate up to four disk drives with a total on-line storage capacity of 32.5M bytes. A multiplexer extension module allows the four asynchronous RS-232 communication ports to be expanded to eight ports.

The system can accommodate up to 24 interactive terminals, each with its own printer, the company claimed.

The basic Adviser III configuration includes a 64K CPU, eight-port terminal multiplexer, one 80M-byte disk drive, one CRT, a utility table and a 165 char./sec matrix printer as well as the Avos operating system.

A maximum of eight disks can be accommodated by the system; after the initial four drives, another controller is required.

Two printers can be attached directly to the system.

The eight RS-232 ports can be expanded to 24 with extension modules, BSP said. Memory can be expanded to 304K bytes with a memory expansion feature, but the first 16K bytes of additional memory is reserved for system diagnostics, the firm noted, and is not available for use under the operating system.

The system also provides synchronous transmission which requires one SC-100 communications facility attached to an RS-232 modem.

Emulators available include IBM 2780/3780, 360/20 Hasp workstation, IBM 3 workstation, Control Data Corp. 200 UT, Univac DCT 2000 and International Computers Ltd. 7020.

The minimum Adviser II configuration costs $38,400; a 10M-byte disk drive costs $10,900 and the multiplexer extension module is priced at $2,800.

The basic Adviser III configuration costs $65,800; an additional 80M-byte disk drive is priced at $19,900 while the multiplexer extension module for this model costs $4,600.

An additional 16K bytes of memory for the Adviser III costs $3,500, as does the memory expansion feature. The synchronous communications facility costs $4,000 while remote job entry emulation for the IBM 3780, for example, costs $1,500.

BSP is at 2121 Campus Drive, Irvine, Calif. 92715.

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PRIME

In Search for More Flexibility

Mini Bumps Large Mainframe Out of School's DP Room

By Esther Surden
Of the CW Staff

KLAMATH FALLS, Ore. – A "modern" minicomputer has bumped an IBM 1130 system from the computer room at the Oregon Institute of Technology (OIT) here to allow the school additional flexibility in academic and administrative functions, according to Frank Vaskelis, director of the computer center.

"We simply ran out of computing power on the 1130. The system was being run by students almost round the clock and would only accommodate one user at a time," Vaskelis said.

The mini was picked through the established Oregon state bidding procedure, he reported. Two southern Oregon schools got together to replace the 1130s and issued a joint request for proposal to 30 vendors; only Hewlett-Packard Co., Digital Equipment Corp., Prime Computer, Inc. and Harris Corp. responded to the bid.

The systems then were put through a technical evaluation, benchmarking, and financial analysis and a Harris system was chosen because it "performed the best in all three categories," Vaskelis said.

Although academic programs are all up and running on the system, which was installed in June, the school is still in the process of converting some of the programs from the 1130. "The Fortrans are compatible and Cobol reasonably compatible, making for a fairly easy conversion," he noted.

For administrative tasks, the school is planning to tie the system into a network of state college computers, Vaskelis said.

"We are currently building an administrative and academic computing network in the State of Oregon tied into a Control Data Corp. Cyber 73 system at Oregon State and a Honeywell 66/40 at the state Data Services Division," he explained.

Communications via IBM 2780 line protocol between the 66/40 and the Harris and via UT200 to the Cyber system are expected to take place. The Harris system will then be used as a remote job entry terminal to the larger systems in an integrated central student information system, Valkelis said.

The system includes a Slash 7 CPU, 192K bytes of memory, an 80M-byte disk, 600 card/min card reader, 300 line/min printer, CRT console, one 9-track 800- and 1,600 bit/in. tape drive and a communications multiplexer. It cost the college about $160,000, Vaskelis said, adding the school has a third-party lease.

Every student at OIT is required to take at least one computer programming course before graduation, Vaskelis noted, so the system gets a lot of work. The student body has a population of about 2,300.

Maintenance for the systems has been "exceptional," Vaskelis said.

"I can anticipate that if we have a problem, the engineer will be here within an hour, dependent only on if he has been called out to service the other school's system," he said.

Fingerpointing Plagues Ill. Site

(Continued from Page 41)

software.

IBM told Swigart it would come in to work on the parts of the system untouched by the non-IBM software. Therefore, the only solution was for the firm to keep a copy of the system program at system generation time and to install temporary fixes while retaining the original program, the assistant DP manager recalled.

Back to Original Vtoc

The next step was to absolve all the other vendors except IBM, so the firm had to reconvert to the 50-file Vtocs without the Extend package, a process which it completed of necessity within a weekend, Swigart said.

IBM then came in to help straighten out the supervisor, which was still misplacing files, he noted.

But things are finally looking up for the firm, even though it is back where it started with a 50-file limit. It is faced with an upgrade to a 3/15 to get the 1,000-file limit it needs, but the upgrade would have come pretty soon anyway, Swigart said, because the firm plans to put some interactive on-line applications on the system and the 3/10 is "very inefficient" in that regard.

The 3/10 was not intended to support 1,000 files, an IBM spokesman commented. In order to do so, the user would have to go in and modify the control program to detrimental effect.

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System 5000 is presently being used for a number of different tasks. Updating all physical property inventories and land records, for example. And most importantly, progress checks of audits.

System 5000 has proven so flexible and so easy to use (non-technical staff quickly learned how), the Auditor's Office has plans for lots of other applications. Like maintenance schedules for state-owned equipment. A land file based on deeds, not just reports. And personnel and payroll files.

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Automation Need Not Be Painful for First-Time Users

Special to Computerworld

Although larger businesses automated all or parts of their DP operations long ago, there are about 500,000 small businesses in the U.S. that have yet to install their first computer system. About 315,000 of them are in the retail, wholesale and distribution sector.

Many users have shied away from computers – even though they can easily afford them – because of stories about the difficulties some companies experienced in adjusting to new ways of doing things imposed by the computer.

Painful computerization is a symptom of something wrong. Either the software is inappropriate for the purpose or it is a case of shoehorning an operation into a proprietary "prepackaged" system which is not quite appropriate because it does not allow the businessman to run his business as usual.

When, however, the computer system and the software programs are designed to fit the particular requirements of a company, computerization can be quick and totally painless.

Small business computers and programming technology are now sophisticated enough to adapt to, rather than force changes on, a business operation.

By designing the computer system to individual requirements, the user not only saves money in the long run, but also can convert from manual to computer operation more smoothly. Operation becomes more efficient.

The First Steps

Once the decision to automate has been made, those responsible for the daily operation and fiscal mansgement of a company should outline in specific details the benefits expected from autometion.

Usually included in such a list will be time and manpower savings, better control of overhead, coordination of inventory and supplies with customer demands, more accurate and timely accounting and billing, more effective fleet maintenance schedules, improved cash flow planning, reduced overhead, better route planning, expansion plans, etc.

Once expectetions and objectives are clear, the user should discuss the ideas with an expert in the field who could be a computer analyst.

After a thorough study of the user's operation and way of doing business, the analyst can tell where computer automation can best and most easily fit, give a ballpark idea of costs and help deeide whether leesing or purchasing a system outright is the best way to go.

The anelyst may even inform the user that some things he wants computerized can be maintained better and less expensively as they are done now, while other operations could best be converted through customized computer programming or by programs available in stendard packages.

Functions such as accounts receivable, payroll, sales analysis, customer billing and general ledger are the things that should be tackled first and can be done the quickest.

What type of computer should a first-time user get? There are many small business computers designed for use by companies doing between $500,000 and $50 million in sales.

A consultant can help select five or six computer companies to consider. When contacting these companies, the user should describe his requirements – the things he wants computerized – and ask for a list of users, preferably nearby, as references.

Users talking to the hardware manufacturer should look for these things:

- Every manufecturer has several alternative software packages to offer with his machine. Make sure these programs are flexible enough to be easily upgraded and enhanced if the business expands or becomes more complex.
- Discuss the types of mistakes that occur most often in the business and make sure proper controls for them can be built into the system right from the start.
- Understand how the vendor's software package fits the operation and how extensively the software package must be modified. As little as a 10% modification of a standard application package may make it more economical to have s completely customized program prepared.

Programming the Computer

Once the choice is msde as to which business computer system or hardware is wanted, the user should watch out for the "expert" who offers to automate the business for less money than a reputable software supplier or computer manufacturer. This expert may not be a bargain in the long run.

The expert may be undercapitalized. There have been cases where this bargain-basement programmer had to go out of business in the middle of a project, leaving his customer with a large service bill and an incomplete program that someone else had to start all over again.

The established software supplier can provide:

- Backup computers to help the firm over peak-load periods when the company's own computer cannot handle the volume but a larger computer would be uneconomical for the rest of the year.
- Off-premise storage facilities where an extra set of tapes or disks can be kept.
- A guarantee for the effectiveness and correctness of the developed program and a staff of trained specialists that can upgrade or alter it when necessary.
- Financial stability.
- Documentation and education.

Users should make sure they are involved in every step of the programming phase of computerizing their businesses. Users who are will not find the computer a strange, complicated machine but a simple tool to help conduct the business.

During programming, the user should:

- Insist the programming be done on the software supplier's computer. Why have an expensive computer stand idle for one or two months while the programmer sets it up?
- Make sure the printout forms meet specific needs and are approved for content, ease of reading and comprehension.
- Personally approve and test every program as it is written into the software system. Waiting until the entire job is finished and then deciding to make changes is expensive.

Teaching and Documentation

It is also important to have the software supplier teach all those on the steff who will work with the computer. Top officials may be familiar with how the computer works, but the people who must enter and retrieve data every day must be well-versed in the operation of the machine, as well as familiar with the underlying operating principles and the general software system.

In addition to instruction, the vendor should provide complete documentation on the system and programs in the form of flow chsrts and operating manuals that will serve as written instructions on how to manage any application written into the system.

Finally, the user should keep those old manual records in an off-premise facility. He may need them after an emergency, such as a fire or flood.

And the user should also keep both manual and automated business procedures going simultaneously for a few weeks as a cross-check on the accuracy and dependability of the programs and of the operators. This may be somewhat time-consuming or expensive, but it is only for a few weeks and it always pays to be safe.

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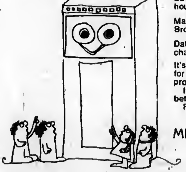

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COMPUTER INDUSTRY

CI Notes

TRW, Singer Complete Maintenance Transaction

LOS ANGELES – TRW, Inc. has assumed maintenance and customer support of the Singer Business Machines (SBM) Division's North American operations.

Leonard McKenzie will head a new unit responsible for TRW's point-of-sale (POS) systems, the financial terminals business acquired from Financial Data Sciences, Inc. and service responsibilities for the Singer POS terminals and the Singer System Ten computer base, acquired earlier this year.

As of April, TRW's Communications, Systems and Services (CS&S) Division had 65,000 terminals, including over 4,000 POS terminals, installed. Singer's installed base of POS terminals was over 60,000.

In addition, CS&S' Financial Systems Division had installed more than 7,000 terminals.

As part of the completion of the transaction, TRW has offered employment to more than 2,200 SBM employees. These will supplement about 300 CS&S service employees.

Amcomp to Supply Amdahl

SUNNYVALE, Calif. – Amcomp, Inc., formerly Data Disc, Inc., has landed a contract with Amdahl Corp. for its 8400 disk drives and its 8010 controllers.

Under the 17-month contract, orders for $244,000 worth of equipment have been released to date, according to Thomas P. Quinn, vice-president of marketing.

Supershorts

Bunker Ramo has signed four distributors for its Bank Control System 90 and Branch Terminal System 2000 outside the U.S. They are Vermon Kantoomachines N.V. in The Netherlands; Besscorp of San Juan, Puerto Rico; Datacom S.A. of Caracas, Venezuela and Dataprep Ltd. of Hong Kong.

– – · –

NCR will handle international sales for Quantor Corp.'s 115 minicomputer-controlled computer output microfilm recorder/processor and 205 high-speed vesicular microfiche duplicator.

With New Pricing Policies

Can Mainframers Maintain Profitability?

By Molly Upton
Of the CW Staff

The new pricing structures embraced by many mainframers and the likelihood of more mainframe announcements by IBM within the near future is causing some observers to question the long-term profitability of the computer industry.

The increased pace of activity in the mainframe area – marked by memory capacity extensions, price reductions and CPU performance enhancements – appears to indicate the mainframers have taken up the challenge of IBM's new pricing scheme effected in its 370/138 and 148 [CW, Oct. 11].

But while the dwarfs are running toward the cover of the lower price umbrella, some of them have chosen not to take shelter.

And those who have managed to squeak under it have found they have lost much of the price advantage they formerly had compared with IBM's 370/135 and 145, if one takes a CPU with 1M byte of main memory as the means of comparison.

The IBM move has analysts speculating the 138 and 148 may be only part of a forthcoming rapid fire of new CPU announcements that could wear out the soles of the competitors' running shoes as they attempt to match the pace.

"Given the industry's competitive structure and the continued dominance of IBM, will the returns on capital in the longer term for the other manufacturers be adequate to justify their continued high rates of investment in this industry?" a consulting firm's report asked.

In the short run, the reduction in purchase prices by other vendors should encourage heavier shipments of purchased rather than leased machines, thus compensating for the possible narrower margins, the report observed.

However, in the longer term, IBM's announcements signal "a shift in the industry's pricing structure that could reduce the inherent profitability of the business," according to the study.

IBM previously set the tone, and the umbrella, by its pricing structure that maximized long-term returns. Pricing is becoming more competitive, however, because IBM's pricing power has been eroding as users become more sophisticated and more numerous alternatives such as plug-compatible memory, peripherals and mainframes have arisen, the report observed.

In its introduction of the 138 and 148, IBM took the unprecedented step of offering improved performance at a lower price, reducing the purchase/rental multipliers to roughly 40 compared with the over 50 times average for the 135 and 145, and giving its four-year Term Lease Plan a 9% discount from Monthly Availability Charges, according to the report.

Analysis

These actions seemed aimed at "thwarting the plug-compatible memory and emerging plug-compatible CPU competition" as well as "bringing price elasticity to bear on the intermediate systems marketplace," the report observed.

The price/performance improvement to be gained from going from a 135 to 138 or 145 to 148 is essentially on a par with that available in a sideways move between the 360 and 370 series, according to Jim Peacock, editor of *EDP/Industry Report.*

Shrinking Differentials

Taking a look at shrinking price differentials, sources indicated other mainframers' systems were offered at prices typically 20% less than IBM's 135 and 145 before the 138 and 148 announcements.

A look at the current purchase prices on a CPU and 1M byte of memory shows that while Univac's 90/60 offered a savings of $114,604, or 19%, over a 135, this

(Continued on Page 47)

Proposed A-76 Addition Brings Heated Reactions From Agencies

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. – The Office of Management and Budget (OMB) has proposed procurement rules that may force government DP users to favor commercial services even if they cost more than doing the same task in-house, spokesmen of several federal agencies have complained.

DP suppliers with government contracts to gain, on the other hand, are claiming the proposal leaves loopholes that will permit federal agencies to avoid compliance.

The rule under comment is a supplement to Circular A-76, which details the conditions under which agencies can acquire DP equipment and services [CW, Oct. 18].

Since August, OMB's Office of Federal Procurement Policy has received 40 written and two telephoned responses to the proposed policy directive, according to William D. Russell, deputy assistant administrator for logistics.

Of great concern to the agencies was the size DP staff they would be permitted to keep in-house, the letters indicated. Without trained staffs, the departments of Treasury, Transportation (DOT) and Labor (DOL), the Federal Trade Commission and the Federal Home Loan Bank Board doubt their ability to select or properly manage out-of-house service contracts, they said.

Also of concern was the effect cutting back in-house installations would have on federal DP employees. One agency recommended asking for Civil Service Commission guidance in this area.

Several agencies with in-house systems to lose argued the supplement to A-76 should have concentrated on contracting services for new applications and systems rather than those already in place and operating.

Others said OMB wasn't giving them enough time to review in-house systems and their alternatives by setting a deadline of Sept. 30, 1977 for these studies.

Existing government sources should be relied on before the agencies turn to commercial DP sources, others pointed out. DP equipment acquisitions under $50,000 should be exempted from review and approval under Circular A-76, another suggestion recommended.

If OMB didn't deal with minicomputers, turnkey systems and federal DP service centers like those run by the General Services Administration (GSA), the Department of Agriculture and the Department of Health, Education and Welfare

(Continued on Page 45)

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Government Agencies Worried About A-76 Supplement

(Continued from Page 44)

(HEW), its DP procurement policy would be applied unevenly and unfairly, others said.

Others feared commercial services prices would skyrocket once agencies had dismantled their DP operations.

Many stated they couldn't begin to make cost comparison studies of commercial services without comprehensive guidelines; seven agencies said they will look to OMB for such guidance.

The Department of Housing and Urban Development asked for standardization of the length of system life, fair market values of facilities and the salvage value of equipment, in particular. DOT wanted to know how to go about depreciating DP equipment.

The GSA was concerned commercial firms wouldn't go into any detail in their proposals unless actual bids were requested.

The State Department said agencies will need time "to allow potential contractors to demonstrate their competence and efficiency with small applications before entrusting them with vital agency systems."

The 13 agencies supporting the measure as proposed tended to be the smaller ones that satisfy their DP requirements through low budget allocations and often on the systems of larger agencies.

Russell noted, however, the two phoned responses also backed the measure and they were from the Department of Agriculture and HEW -- agencies with two of the largest computer installations in the Federal government.

Twenty-nine additional responses, including letters from 23 agencies, five suppliers and one congressman – Rep. Jack Brooks, who chairs the House Government Operations Committee – provided the office with extensive commentary on omissions and errors.

The Computer and Business Equipment Manufacturers Association (Cbema) agreed that a mix of in-house and contracted services would be the best approach to DP in government and that contracting out for services should be as "cost-justified" as any in-house approach.

The firms and their representatives generally concurred with the agencies that comprehensive cost comparison guidelines need to be developed and that any discussion of what an outside contractor might provide would have to depend on more than the services an agency needed performed.

Computer Sciences Corp. (CSC), Control Data Corp. and the National Council of Technical Service Industries sought to stifle their chief competition from government in-house systems and the "service bureau" agencies by calling for A-76 review and approval of all upgrades in addition to those for replacement equipment.

CSC suggested OMB require agencies to publish the results of their cost-comparison studies in the *Federal Register* and allow industry time to react to their needs. CSC would also have OMB come down hard on user agency "excuses" that acquiring outside DP services would delay programs and hamper missions.

Memorex Admits Payments Abroad

SANTA CLARA, Calif. – Memorex Corp. has disclosed that certain of its subsidiaries made "commission-type" foreign payments totaling $577,000 over a period of five and a half years.

The internal investigation did not discover any evidence of "improper payments in the U.S., any political contributions domestically or internationally, any type of slush funds or secret accounts or any underpayment of U.S. taxes," a company spokesman said.

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From Jan 1, 1971 through June 30, 1976, "commission-type" payments of not more than $504,000 "appear to have been made by or on behalf of certain foreign subsidiaries of the company to low-level nonelected foreign government officials or to employees or representatives of foreign customers to facilitate foreign sales."

In addition, payments totaling about $73,000 appear to have been made by or on behalf of certain foreign subsidiaries of the company to low-level nonelected foreign-government officials "to persuade them to perform their required functions."

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TANDEM

Earnings Top $1.7 Billion

IBM Posts Record Net in Nine Months

ARMONK, N.Y. – While IBM turned in record third-quarter and nine-month earnings with increases of 18.5% and 23% respectively over the year-ago periods, the quarter's total ranked only third in record quarters for the firm.

IBM's third-quarter earnings totaled $586.9 million, which failed to match the $592.8 million in the preceding second quarter and the $588.6 million in the 1975 fourth quarter.

Revenues rose 9.9% in the quarter and 13.7% in the nine months from the year-ago periods.

Chairman Frank T. Cary reiterated his statement that "it appears unlikely the quarter-to-quarter rates of growth over the prior year can be sustained for the remainder of 1976 because of the record amount of outright purchases of DP equipment in the final quarter of 1975."

One reason the third quarter's 18.5% rise in net income was outpaced by the 25.5% increase in the first half is that in 1975 IBM had a stronger second half than it did first half.

Cary said the quarter and nine months showed "satisfactory gains" in earnings. During the most recent quarter, IBM's level of outright sales "continued at the relatively high levels experienced during the earlier quarters of 1976," he added.

Earnings for the quarter, aided by a sharp rise in other income, totaled $586.9 million or $3.90 a share compared with $495.2 million or $3.32 a share in the same period last year.

Other income before taxes, consisting primarily of interest realized, jumped 79.7% to $132.6 million during the quarter. The gain in other income accounted for 32% of the total third-quarter profit increase.

Revenues for the third quarter rose 9.9% to $3.96 billion from $3.6 billion in the same period last year. The 1976 figure was a record for a third quarter.

Income from rentals and sales rose only 3.4% to $2.59 billion while outright sales showed a 24.7% increase to $1.37 billion.

During the nine months, earnings reached $1.72 billion or $11.47 a share compared with $1.4 billion or $9.41 a share in the year-ago period.

Total revenues rose 13.7% to $11.79 billion compared with $10.37 billion in the nine months last year.

Outright sales jumped 36.2% to $4.11 billion compared with $3.02 billion in the same period last year, while rental and service revenues rose 4.4% to $7.67 billion compared with $7.35 billion a year ago.

Other income during the nine months jumped 42.2% to $356.9 million.

Datatab, Gambit Merging To Market Turnkey Minis

NEW YORK – What do you get when you merge a minicomputer software and consulting firm with a package-oriented service bureau?

Datatab, Inc. and Gambit Management Strategies, Inc. hope to get an aggressive turnkey minicomputer company.

A letter of intent has been signed for the acquisition of Gambit by Datatab, a merger to which Datatab reportedly brings a solid financial position and Gambit a proven marketing group and customer base.

Datatab has been involved primarily in the service bureau business, specializing in packages for the processing of market research data, accounts receivable, law office services and direct mail marketing.

It also offers Solution 77, a package which covers five basic applications: order entry/inventory control/billing; accounts receivable; accounts payable; general ledger; and payroll.

All Ranges

In addition to being in the service bureau business, Datatab has been selling turnkey systems at the low end of the spectrum, in the $40,000 to $90,000 range, according to Stanley Schiffman, president.

Gambit, in addition to selling software and services, has been marketing to the higher end, the $100,000 to $150,000 minicomputer range, he said.

"Together, we anticipate having all the possible ranges covered," Schiffman said.

"We will be in a position to offer our customers what they need with a two-pronged approach – service bureau or minicomputer. It's going to be a much more successful effort for us," he added.

Leonard Farano, executive vice-president of Gambit, described the merger as "typical of what's happening with many service bureau firms.

Beginning to Push

"Because the minicomputers are beginning to push service bureaus around, they in turn are starting to look at minis on two bases – first, to protect their customer base and, second, to see what potential there is for developing a separate mini division."

On that basis, Datatab, like Gambit, became an OEM customer of Digital Equipment Corp. Gambit is also an OEM customer of Data General and Hewlett-Packard.

The new venture will continue to sell software packages and to do customization work, Farano said, "but the trend will be to develop software modules which will be easier to customize than starting from scratch.

"Our thrust will be to develop proprietary packages along an industry segmentation line so we will be able to exploit our experience in the retail and garment textile area and Datatab's experience in the law and apparel industries," he noted.

DG Plans Agreement to Buy DCC

SOUTHBORO, Mass. – Data General Corp. (DG) has announced plans to acquire Digital Computer Controls, Inc. (DCC).

The acquisition would end the longstanding litigation between the two companies, according to a "preliminary understanding" reached last week.

The firms have recently been involved in two suits concerning DCC's alleged misuse of DG trade secrets. The first suit related to DCC's use of DG maintenance logic drawings for the Nova 1200 in the design of DCC's D116 [CW, Nov. 16]; the second charged DCC's models 216, 316, 516 and Mod 5 were derived entirely from the D116 and thus also abused DG's trade secrets [CW, Feb. 2].

Last November, a Delaware court ruled in favor of DG. Under the preliminary acquisition agreement, the Delaware Supreme Court will be asked to delay ruling on an appeal on that decision.

A DG spokesman said the acquisition plan did not arise from the suits.

Contracts

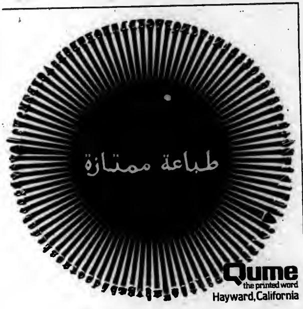
Logican, Inc. has received a contract from the U.S. Department of Transportation to study the feasibility of developing an automated command verification system utilizing computer speech recognition and generation for use on Coast Guard vessels.

National Sharedata Corp. has been awarded a six-year, $3.5 million contract extension from Millikin National Bank of Decatur, Ill., to manage the bank's computer facilities and to market DP services. In addition, National Sharedata has signed a five-year management contract with United Financial Services Corp. of Rockford, Ill., for the operation of its DP facility.

Tai, Inc., a subsidiary of E-Systems, Inc., has received a $260,000 contract from the Administracion Nacional de Telecommunications of the Republic of El Salvador for the preparation of a plan leading to the development of a telecommunications system.

Bunker Ramo has signed a contract with Municipal Credit Union of New York City for the installation of its Model 2001 on-line teller system in each of the 100,000-plus member Municipal Credit Union's teller stations.

System Development Corp. has received contracts from the Automobile Club of Southern California and Garrett Corp. for the installation of on-line, real-time claims administration systems to process health insurance claims.



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Sees Revenues Doubling

Small CRT Maker Expects Big Growth

By John P. Hebert
Of the CW Staff

LOS ANGELES – A small manufacturer of compact terminals located here is thinking big – at least in terms of company growth.

Informer, Inc. had gross revenues last year of about $1 million, but projections for this year have been circling around the $2 million mark, according to Byron Cole, the firm's president.

Susie Mora, product inspector, checks out the electronics and cosmetics of a Model 301.

In fact, Informer has been doubling its revenues for the last few years; Cole anticipates – and is planning for – gross revenues to hit the $30 million mark sometime around 1980 solely from the compact CRT terminal and printer market.

"The company is small by a lot of standards, but for us it is a great, young new company," Will Little added. Little is Informer's vice-president of marketing.

"We specialize because there is a real need for compact units. IBM is going to smaller units with smaller CRT screens like the one in the IBM 5100 system because they help concentrate the field of view where a large amount of information needn't be displayed," he said.

The units, he noted, take less room, and there are many applications where a compact terminal and a 6-in. CRT are more useful.

These application sites include the pharmaceutical, banking, library and hotel reservations areas or, as Little put it, "it runs the gamut" of possible installation sites.

The firm's hottest products are an interactive Teletype-replacement terminal known as the Model 301 and the Model 302 poll block terminal with a daisy-chaining capability, Little said.

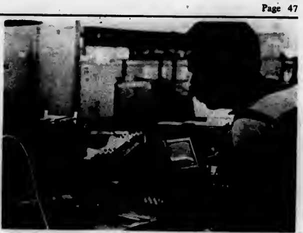
Informer also has an intelligent device in the Model 303, a user-programmable terminal based on a Signetics Model 2650 microprocessor.

The Model 303 has a signature verification unit as an option for users such as banks – Informer's latest target in the small terminal business, Little said, adding all of the firm's terminals are capable of operation from 110- to 9,600 bit/sec and have RS-232 serial interfaces.

"We're not trying to make terminals for programmers," Cole stressed, explaining the existence and need for compact terminals with small screens.

"We're making terminals for the user to use; they fit in places where other terminals just don't fit. Also, placing large amounts of data on a display defeats the function and purpose of keeping as small an amount of data as possible in the CPU.

"The little terminal lets the computer select information for the user. That's the purpose of the computer," Cole said.


CW Photos by J. Hebert

Andre Johnson runs a program test on a terminal in Informer's production area.

Informer is turning to intelligent terminals as a logical design direction because the cost of intelligence has been decreasing and will be cheaper in the future, he added.

Can Mainframers Hold Profitability After Moving to Combat IBM Pricing?

(Continued from Page 44)

has been reduced to $57,116 or 13%.

The difference between a 90/70 and a 145 or 148 was $351,918, or 30%, and is now $87,188 or 13%.

NCR Corp. and Honeywell Information Systems, Inc. (HIS) introduced the Criterion 8570 and 66/05 respectively after the dual IBM announcement and priced them between the two IBM machines.

HIS extended the main memory size on its 66/10 to 1M byte. The machine costs $79,715, or 12% less than the 148.

While a 1M-byte Burroughs B2800 had a margin of 22% off the 135, it is 6% more than the 138 despite a price cut of $7,000.

The B3800, which had a 3% price advantage compared with the 135, now costs 15% more than a 138.

The new B6807 was announced at a price $40,000 over the 138 but $106,200 less than the 148.

What About Margins?

No longer do sizable price advantages abound. What does this do to the other mainframers' margins?

One fact to keep in mind is that many of the price reductions effected were made possible by a switch to MOS memory. Univac stated its new pricing on its 90/60 has not affected its margins on the product. But can the other manufacturers say the same?

And what if, as some suspect, there will be additional IBM introductions, possibly to fill the price gap that has been created between the 148 and the 158, such as a multiprocessor version of the 148, a further down-pricing of the 158-3 or possibly still another new system introduction?

"Any such moves will further intensify competition at the high end of the marketplace and probably require compensating moves by the other mainframe suppliers in this typically very profitable sector of their business," the consulting firm's report suggested.

And the lower purchase/rental ratio on the 138 and 148 could be interpreted as an indication IBM expects these to have a shorter product life.

The potential introduction by IBM of new products, accelerating the product cycle, "could place further strains on the ability of the other manufacturers to keep pace as well as reducing the time period over which investments in new systems can be recouped," the report observed.

Despite mainframers' responses, the report said, the IBM actions "should slow drastically if not reverse the incursions they have been making into IBM's market share."

In the past, IBM's new systems carried higher price tags, reflecting "the largely replacement character of the market, with IBM's revenue growth dependent on migrating the user up to higher priced systems," the report said.

Also, IBM's price umbrellas for its 135 and 145 were "particularly high."

Analysts cited incursions into IBM's base and indications showing most of IBM's 135 and 145 business was upgrading users already in the IBM fold.

About 47% of the Univac 1106s and 25% of the Univac 9400s installed by respondents in a consultant's survey had replaced IBM systems.

About 15% of B4700s and 8% of B3700s in the survey had replaced IBM systems. And 17% of Honeywell 6000s in the survey replaced IBM units.

BASF Planning Hikes

BEDFORD, Mass. – BASF Systems, Inc. plans to raise prices on its computer tapes by about 10% toward the end of this year.

Although the company has been absorbing past increases in materials costs, in some cases up 20% in the past two years, price erosion in the tape market is forcing BASF to pass part of the increases on to customers, according to John J. Healion, director of marketing for BASF's computer and business products.

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Russians Testing NCR POS Units

RIGA, USSR – Babushkas, caviar and borscht are a few of the items soon to be processed through the checkout stand by a point-of-sale (POS) system here.

NCR is installing two POS test sites in the USSR, one in Leningrad and one here. Both installations are similar, according to Udo W. Birk, director of international retail systems.

In Riga, NCR has installed 11 NCR 250 electronic cash registers equipped with tape cassettes and color bar code wand readers.

The system also includes an NCR 8200, two NCR 7200 data entry units and an NCR 747 tag printer which will produce color bar coded tags.

"The store in Riga handles about 40% soft goods and 60% food or grocery items," Birk said. "The plan is to tag all soft goods with a color bar code and then automatically read them at the point of service."

The Leningrad installation, scheduled for later this year, will be the same as Riga's except the terminals will be used at the point of service.

Field engineering support for the two installations will be available from an NCR-trained USSR field service organization, Birk said. NCR will offer assistance if major problems develop, he added.

"We will not have NCR personnel at the test sites, other than at the initial installation time. But support people are available on short notice as needed," he said.

"Our representatives are in Moscow four to five times each year for periods of two to three weeks on a regular basis," he noted.

Other Orders & Installations

Morinaga & Co. Ltd. of Tokyo, a confectionary manufacturer, has ordered a Univac 1100/11 system from Nippon Univac Kaisha, Ltd. for integrated sales and inventory control applications.

Stovner Supermarket, near Oslo, has installed Norway's first NCR 255 checkout system including eight Model 255 terminals linked to a Model 726 minicomputer.

ELF-Aquitaine, a French national oil producing and distributing group, has ordered a Model 32 minicomputer and related peripherals from Systems Engineering Laboratories, Inc. The equipment will process data from seismic explorations.

L.M. Ericsson, Stockholm, has ordered Model 1520 tape drives from Kennedy Co.

Lloyd's of London has ordered a PDP-11/70 from Digital Equipment Corp. for use in a four-year project to optimize the company's services.

Elder Smith Goldsbrough Mort Ltd. has ordered three NCR Criterions to be used as the basis of an Australian network for order entry and billing applications.

France's Centre Informatique de Gestion Appliquee has installed a Cyber 172 system from Control Data Corp. for use in loans processing.

The Chilbolton Observatory in Hampshire, England, has installed a pair of GEC 4080 computers from GEC Computers Ltd.

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Programmer

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Programmer

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PROGRAMMING

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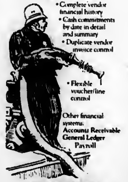

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CDC Earnings Jump 63% in Third Quarter

MINNEAPOLIS – Control Data Corp. managed to get both its computer operations and Commercial Credit Co. subsidiary on the same upward track during the third quarter and nine months.

As a result, earnings jumped 63% in the third quarter compared with the restated year-ago figures.

"For the first time in several years, we are seeing a good improvement occurring simultaneously in both our financial and computer operations," William C. Norris, CDC chairman, said.

During the third quarter, computer business income rose 28% to $5.5 million compared with $4.3 million in the same period last year. It more than doubled in the nine months.

Revenues in the computer business rose to $329.1 million compared with $310.2 million in the year-ago quarter. Broken down, sales contributed $151.9 million compared with $148.4 million while rental and services revenue accounted for $171.8 million compared with $155.8 million in the same period last year.

Quarter Results

For the quarter, CDC's corporate earnings totaled nearly $15 million or 87 cents a share compared with a restated $9.2 million or 53 cents a share. This was $811,000 less than the earnings posted originally for the 1975 period.

The company's computer business is increasingly feeling the positive effects of the economic recovery, Norris said.

Orders for systems are reflecting less special technical content, he noted, and margins on rentals, services and sales of systems all improved during the third quarter.

In addition, better management of computer business assets resulted in a nine-month savings of $8 million in interest expense, he said.

CDC increased its R&D expenditures during this period to $41.8 million compared with $34.7 million, he said.

Demand for OEM peripherals continued to improve.

During the nine months, CDC's corporate earnings totaled $36.7 million or $2.12 a share compared with a restated $29.4 million or $1.73 a share, down $3.4 million from the original figure.

The computer operations contributed $9.1 million compared with $4.2 million in the same period last year.

Computer revenues rose to $970.8 million compared with $891.6 million in the 1975 nine months.

Sales reached $466.8 million compared with $412.6 million while rental and services revenues rose to $486.4 million compared with $462.3 million.

Commercial Credit's contributions to earnings rose 92% in the third quarter to $9.5 million. Its revenues were slightly below the $164 million reported in the third quarter last year, the firm said.

During the nine months, Commercial Credit's income rose to $27.6 million compared with $25.2 million in the same period last year.

Combined computer and Commercial Credit revenues for the nine months rose to $1.45 billion compared with $1.39 billion for the first nine months of 1975.

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Third Quarter Also Record

Burroughs Posts Nine-Month Records

DETROIT – Burroughs Corp. turned in record earnings and revenue for both its third quarter and nine months with earnings rising 13% and 9% respectively over restated 1975 results.

Burroughs' third-quarter earnings totaled $37.2 million or 92 cents a share compared with a restated $32.8 million or 83 cents a share in the year-ago period.

In restating its 1975 results to include unrealized exchange gains on foreign currency long-term debt, Burroughs increased its 1975 third-quarter earnings from $27.5 million.

Revenues for the quarter rose to $443.2 million compared with $367.7 million in the same period last year. Rental and service revenue increased 23% in the third quarter while revenues from outright sales rose 18% compared with the year-ago figures.

During the nine months, Burroughs' earnings reached $103.9 million or $2.58 a share compared with a restated $95.3 million or $2.41 a share in the same period last year. The 1975 figure was $91.6 million before it was restated.

Revenues during the nine months rose 14% to $1.3 million compared with $1.1 million in the year-ago period.

Rental and service revenues increased 24% while revenue from outright sales rose 7%.

The strong order trend of the past several quarters continued in the third quarter, according to Ray W. Macdonald, Burroughs chairman.

Worldwide orders for the nine-month period rose 22% over the same period last year, he said, and orders were good in both the U.S. and overseas markets.

Burroughs' backlog has risen 11% since the beginning of the year.

NCR Earnings Soar 58% in Quarter

DAYTON, Ohio – NCR Corp.'s third-quarter earnings jumped 58% on a 9% increase in revenues compared with the year-ago figures.

The improved third-quarter results were credited by Chairman William S. Anderson principally to improved margins resulting from the company's new products programs and to continued expense-control measures.

Sale of Subsidiary

NCR sold a subsidiary, Electronic Communications, Inc., which resulted in a $2.1 million gain in the third quarter.

"Increased shipments of computerized systems for retail stores, banks and other financial institutions also played a role," Anderson said.

In the third quarter, NCR's earnings totaled $25 million or 93 cents a share compared with $15.9 million or 65 cents a share in the same period last year.

Revenues rose to $569.5 million compared with $521.6 million in the year-ago quarter.

During the nine months, NCR's earnings reached $56.8 million or $2.19 a share compared with $55.2 million or $2.22 a share in the 1975 nine months.

Revenues for the same period totaled $1.6 million compared with $1.5 million in the year-ago period.

Bookings Increase

"Incoming business was generally good during the third quarter and included a substantial increase in bookings outside the U.S. compared with last year's third quarter," Anderson said.

He expects fourth-quarter earnings to be "well ahead" of those in the same period last year, which should bring an increase in earnings for the 12 months, he said.

Correction

Rapidata's revised contract with New York Telephone [CW, Oct. 11] could impact solely the firm's revenues generated from that contract, according to a company spokeswoman. The revisions are not expected to have any impact on the company's overall revenues for the year, which are expected to grow, she said.

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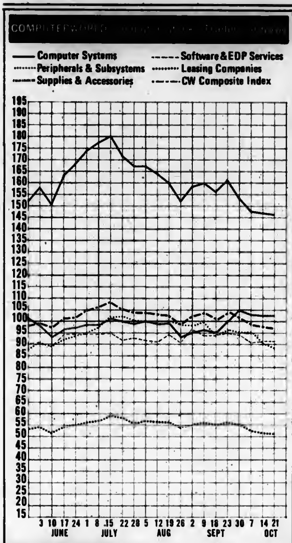
Commonwealth of Massachusetts, Executive Office of Administration and Finance, Bureau of Data Processing and Telecommunications, Administration and Finance Computer Services Center Procurement — Q000016. Proposals will be received by the Commonwealth of Massachusetts Purchasing Agent's Division, 10th floor, John W. McCormack State Office Building, 1 Ashburton Place, Boston, Mass. 02108 up until 2:00 p.m. 11/18/76 for the Administration and Finance Computer Services Center Procurement, which includes the development of Integrated Financial Information and Processing systems, along with associated hardware and software. The request for proposal, identified as the Administration and Finance Computer Services Center Procurement — Q000016 may be obtained at the above address. Bids received after the date and hour named will not be considered. The State Purchasing Agent reserves the right to reject any or all bids and to accept the bid that is in the best interests of the Commonwealth. A bidder's prequalification conference will be held on Oct 26, 1976 at 10:00 a.m., Conference Rooms 2 and 3, 21st floor, John W. McCormack State Office Building, 1 Ashburton Place, Boston, Mass. All interested bidders are invited to attend. Purchasing Agent's Division, Alfred C. Holland, State Purchasing Agent.



Earnings Reports

DIEBOLD
Three Months Ended June 30

	1978	1975
Shr Ernd	$.39	$.15
Revenua	45,927,887	46,642,961
Earnings	2,244,289	830,191
6 Mo Shr	.63	.51
Ravenue	89,062,175	100,831,132
Earnings	3,570,410	2,918,924

GRAPHIC CONTROLS
Three Months Endad June 30

	1976	1975
Shr Ernd	$.92	d$.48
Ravenua	14,393,000	10,052,000
Earnings	a1,037,000	b518,000
6 Mo Shr	1.39	d.98
Revenua	29,243,000	20,588,000
Earnings	a1,753,000	b1,054,000

a-Includes gain from sala of $341,000 invealmant in quarter and $362,000 in six months. b-Includes gain from sala of $58,000 investment. d-Adjusted for Juna 1976 fiva-for-four stock split.

MEDTRONIC
Three Months Ended July 31

	1978	1975
Shr Ernd	$.53	$.46
Ravenua	35,867,000	31,878,000
Disc Op	.....	(54,000)
Earnings	3,945,000	3,430,000

SCAN-DATA
Three Months Endad June 30

	1976	a1875
Shr Ernd	$.09	$.06
Revanue	4,378,908	2,553,916
Tax Cred	75,000	41,000
Earnings	167,906	103,764
6 Mo Shr	.10	.10
Ravenua	7,666,316	5,030,362
Tax Cred	84,000	81,000
Earnings	184,434	179,396

a-Restated.

SYSTEMS ENGINEERING
Yaar Ended June 25

	1976	1975
Shr Ernd	$.02	.....
Ravenua	20,003,100	$17,457,664
Tax Crad	197,860	135,871
Earnings	59,389	(321,889)
3 Mo Shr	.15	.....
Ravenua	6,317,095	4,224,239
Tax Crad	197,860	135,871
Earnings	403,285	(32,732)

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EXCH		1976 PANGE (1)	CLOSE OCT 20 1976	WEEK NET CHNGE	WEEP PCT CHNGE
N	BURPOUGHS COPP	P4-108	89 5/8	+1 5/8	+1.8
C	COMPUTEP AUTOMATION	10- 19	15	+ 1/4	+1.6
N	CONTPOL DATA COPP	1P- 27	23 3/P	+ 1/8	+0.5
N	DATA GENEPAL CORP	40- 60	40 7/8	-3 1/4	-7.3
O	DATAPOINT CORP	24- 46	27 1/4	-1 1/2	-5.2
O	DIGITAL COMP CONTPOL	2- 7	6 1/8	+ 1/8	+2.0
N	DIGITAL EQUIPMENT	138-151	145 3/4	-5 3/4	-3.7
N	ELECTPONIC ASSOC.	2- 5	2 5/8	0	0.0
A	ELECTRONIC ENGINEEP.	7- 16	9 1/4	+ 5/8	+7.2
N	FOXBOPO	2P- 50	44 1/2	- 1/2	-1.1
O	GENEPAL AUTOMATION	4- 11	4 1/2	+ 1/8	+2.8
C	GPI COMPUTER COPP	1- 1	5/8	0	0.0
N	HEWLETT-PACKARD CO	P2-117	81 7/6	-4 7/8	-5.6
N	HONEYWELL INC	34- 56	43 3/4	+1 3/8	+3.2
N	IBM	227-2PP	263 1/2	-9	-3.3
O	MANAGEMENT ASSIST	1- 3	1 3/4	+	+3.5
O	MEMOPEX	18- 33	20 5/8	-1 3/8	-6.2
O	MICPODATA CORP	10- 28	19	-2 5/8	-12.1
C	MODULAP COMPUTER SYS	4- 14	4	+ 1/4	+6.6
N	NCP	24- 37	34 5/8	- 1/8	-0.3
C	PRIME COMPUTEP INC	4- 14	12 1/4	- 1/2	-3.9
N	PEPKIN-ELMEP	19- 27	20 5/8	-1 1/2	-6.7
N	RAYTHEON CO	45- 67	64 3/8	+1	+1.5
N	SPEPPY PAND	40- 52	45	- 1/4	-0.5
O	SYCOP INC	12- 31	11 3/4	- 3/4	-6.0
A	SYSTEMS ENG. LABS	6- 10	6 3/4	+ 1/8	+1.8
N	VAPIAN ASSOCIATES	12- 17	12 1/2	- 1/4	-1.9
A	WANG LABS.	11- 20	14 1/4	+ 3/8	+2.7

LEASING COMPANIES

EXCH		1976 PANGE (1)	CLOSE OCT 20 1976	WEEK NET CHNGE	WEEP PCT CHNGE
O	COPDISCO INC	3- 10	8 3/4	- 3/4	-7.8
A	COMMEPCE GPOUP CORP	2- 3	1 7/8	- 1/8	-6.2
A	COMPUTEP INVSTPS GPP	1- 3	1 5/8	- 1/4	-13.3
M	DATPONIC PENTAL	1- P	7/8	0	0.0
A	DCL INC	1- 1	5/8	+	+10.0
N	DPF INC	5- 8	6 5/8	- 1/4	-3.6
N	ITEL	6- 15	12 5/8	+ 7/8	+7.4
N	LEASCO COPP	6- 19	17 1/2	+1 1/2	+5.3
O	LEASPAC COPP	0- 1	1/8	0	0.0
O	NPG INC	0- 1	1/8	- 1/8	-35.9
A	PIONEEP TEX CORP	6- 9	7 1/4	0	0.0
N	U.S. LEASING	7- 12	P 5/8	- 1/8	-1.4

EXCH: N=NEW YORK; A=AMEPICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVEP-THE-COUNTEP
O-T-C PPICES APE BID PPICES AS OF 3 P.M. OP LAST BID
(1) TO NEAPEST DOLLAR

SOFTWAPE & EDP SERVICES

EXCH		1976 PANGE (1)	CLOSE OCT 20 1976	WEEK NET CHNGE	WEEP PCT CHNGE
O	ADVANCED COMP TECH	1- 3	1 1/2	0	0.0
C	ANACOMP INC	6- 11	7 1/2	+ 3/8	+5.2
A	APPLIED DATA PES.	2- 4	3 1/4	+ 1/8	+4.0
N	AUTOMATIC DATA PPOC	17- 35	27 3/P	+ 3/8	+1.3
C	COLEMAN AMEPICAN COS	2- 6	2 1/4	+ 1/8	+5.8
C	COMPUTEP DIMENSIONS	3- 7	5 3/4	+ 1/4	+4.5
C	COMP ELECTION SYSTMS	5- 9	5 1/4	- 1/2	-8.6
C	COMPUTEP HORIZONS	1- 2	1 1/4	- 1/4	-16.6
C	COMPUTEP NETWOPK	2- 6	5	- 3/4	-13.0
N	COMPUTEP SCIENCES	4- 8	5 7/8	+ 1/4	+4.4
C	COMPUTEP TASK GPOUP	1- 2	1 1/4	- 3/8	-23.0
O	COMPUTEP USAGE	3- 6	3 1/8	+ 1/8	+4.1
C	CONSHAPE	2- 9	4 1/2	- 1/4	-5.2
O	DATA DIMENSIONS INC	2- 4	2 3/4	0	0.0
O	DATATAB	1- 1	1 3/8	0	0.0
N	ELECTPONIC DATA SYS.	12- 18	15 1/2	- 1/8	-0.7
O	INFONATIONAL INC	1- 1	1/8	0	0.0
O	INSYTE COPP	1- 3	1 5/8	+ 1/8	+8.3
C	IPS COMPUTEP MAPKET.	1- 2	1 1/P	- 1/P	-10.0
O	KEANE ASSOCIATES	2- 4	2 1/4	0	0.0
O	KEYDATA COPP	2- 5	1 5/P	0	0.0
C	LOGICON	3- 4	3 3/8	0	0.0
A	MANAGEMENT DATA	1- 3	2 1/8	- 1/8	-5.5
A	NATIONAL CSS INC	13- 25	19 5/P	0	0.0
A	ON LINE SYSTEMS INC	17- 22	17 3/8	- 3/4	-4.1
N	PLANNING PESEAPCH	3- 5	3 3/P	0	0.0
O	PPOGPAMMING & SYS	1- 1	3/8	0	0.0
O	PAPIDATA INC	2- 5	1 5/8	0	0.0
O	PEYNOLDS & PEYNOLD	13- 21	15	- 3/4	-4.7
O	SCIENTIFIC COMPUTEPS	1- 1	7/8	0	0.0
O	TYMSHAPE INC	15- 28	18	+2 3/4	+18.0
A	URS SYSTEMS	3- 5	3 3/4	+ 1/8	+3.4
N	WYLY COPP	2- 7	1 3/4	+ 1/4	+16.6

PEPIPHEPALS & SUBSYSTEMS

EXCH		1976 PANGE (1)	CLOSE OCT 20 1976	WEEK NET CHNGE	WEEP PCT CHNGE
N	ADDRESSOGPAPH-MULT	8- 13	9 7/8	0	0.0
O	ADVANCED MEMORY SYS	4- 10	6 5/8	+ 3/8	+6.0
N	AMPEX COPP	5- 10	6 1/4	+ 1/4	+4.1
O	ANDEPSON JACOBSON	2- 4	2 7/8	0	0.0
C	APPLIED DIG DATA SYS	13- 25	19	+ 3/4	+4.1
O	PEEHIVE MEDICAL ELEC	3- 9	8 1/4	- 1/8	-1.4
A	BOLT,BEPANEK & NEW	7- 11	7 7/8	+ 1/4	+3.2
N	BUNKEP-PAMO	5- 10	6 1/2	0	0.0
A	CALCOMP	4- 7	4	+ 1/8	+3.2
O	CAMBPIDGE MEMOPIES	0- 6	1/2	+ 1/8	+33.3
N	CENTPONICS DATA COMP	20- 36	29 1/4	-1 1/2	-4.8
C	CODEX COPP	22- 42	31	+2 1/2	+8.7
C	COGNITPONICS	1- 1	3/4	0	0.0
O	COMPUTEP COMMUN.	1- 6	5	- 3/8	-6.9
O	COMPUTEP CONSOLES	4- 7	4 1/2	0	0.0
A	COMPUTEP EQUIPMENT	1- 3	1 7/8	+ 1/8	+7.1
O	COMPUTEP TPANSCEIVEP	1- 3	3/4	- 1/4	-25.0
C	CONTEN	4- 5	6 3/4	- 1/2	-6.8
N	CONPAC COPP	20- 25	21	+ 1/8	+0.5
O	DATA ACCESS SYSTEMS	1- 5	4 1/2	- 1/4	-5.2
O	DATA 100	7- 13	8 1/4	0	0.0
A	DATA PPODUCTS COPP	5- 15	10 7/8	0	0.0
O	DATA TECHNOLOGY	1- 2	1 1/4	0	0.0
O	DATUM INC	1- 2	7/8	- 1/8	-12.5
O	DECISION DATA COMPUT	1- 4	1 5/8	0	0.0
O	DELTA DATA SYSTEMS	1- 1	5/8	0	0.0
N	ELECTPONIC M & M	1- 4	3 1/8	- 1/8	-3.8
O	FAPPI-TEK	1- 1	3/4	0	0.0
C	GENEPAL COMPUTEP SYS	1- 2	1/2	- 1/8	-20.0
N	HAZELTINE CORP	4- 12	8 1/8	- 1/8	-1.5
N	HAPRIS COPP	34- 55	50 1/2	+1 1/2	+3.0
A	INCOTEPM COPP	5- 20	12 5/8	0	0.0
O	INFOPEX INC	3- 7	4 1/8	0	0.0
C	INFOPMATION INTL INC	10- 18	12	+ 1/2	+4.3
O	INTEL COPP	54-109	59	+1 1/2	+2.6
A	LUNDY ELECTPONICS	3- 7	3 5/8	+ 1/4	+7.4
O	MSI DATA COPP	3- 7	5 7/8	0	0.0
A	MILGO ELECTPONICS	15- 21	16 3/4	+ 7/8	+5.5
N	MOHAWK DATA SCI	3- 10	6 1/4	+ 5/8	+11.1
C	PENPIL COPP	1- 3	1 7/8	- 1/8	-6.2
A	PEPTEC COPP	3- 8	6	- 1/8	-2.0
A	POTTEP INSTPUMENT	2- 2	1 3/4	0	0.0
O	PPECISION INST.	3- 10	2 1/2	- 1/2	-16.6
C	QUANTOP COPP	4- 6	3 7/8	- 1/8	-3.1
O	PECOGNITION EQUIP	6- 11	7 7/P	- 1/8	-1.5
N	SANDEPS ASSOCIATES	6- 11	8	- 3/8	-4.4
O	SCAN DATA	2- 4	1 1/2	-	-4.0
O	STOPAGE TECHNOLOGY	9- 13	10	0	0.0
O	T BAP INC	5- 10	5 3/4	0	0.0
O	TALLY CORP.	4- 6	3 7/P	- 1/P	-3.1
O	TEC INC	3- 7	6 1/4	- 1/4	-3.8
N	TEKTPONIX INC	45- 65	62 3/8	0	0.0
M	TELEX	2- 5	2 5/8	0	0.0
O	WANGCO INC	11- 22	21 1/8	0	0.0
O	WILTEP INC	2- 2	1 5/8	- 1/4	-13.3

SUPPLIES & ACCESSOPIES

EXCH		1976 PANGE (1)	CLOSE OCT 20 1976	WEEK NET CHNGE	WEEP PCT CHNGE
O	ADVANCED SYSTEMS INC	1- 4	3 3/8	0	0.0
O	BALTIMORE BUS FOPMS	3- 5	3 5/8	0	0.0
A	PAPPY WPIGHT	6- 10	8 3/4	- 1/4	-2.7
O	CYBEPMATICS INC	1- 1	1/2	0	0.0
A	DATA DOCUMENTS	25- 45	45 1/4	0	0.0
O	DUPLEX PPODUCTS INC	15- 24	13 3/8	- 3/8	-2.7
N	ENNIS BUS. FOPMS	6- 8	5 5/8	- 1/4	-4.2
O	GRAHAM MAGNETICS	P- 13	10	- 1/2	-4.7
O	GRAPHIC CONTPOLS	13- 19	15 3/4	+ 1/4	+1.6
N	3M CONPANY	53- 66	61 1/4	0	0.0
O	MOOPE COPP LTD	33- 51	32 3/4	0	0.0
N	NASHUA COPP	11- 18	17 1/4	+ 7/8	+5.3
O	STANDAPD PEGISTER	15- 19	17 1/2	+ 3/4	+4.4
O	TAB PPODUCTS CO	5- 11	5 1/2	0	0.0
N	VAPCO	20- 25	20	- 1/8	-0.6
A	WABASH MAGNETICS	4- 9	9	+ 5/8	+7.4
N	WALLACE BUS FOPMS	19- 25	22	- 1/8	-0.5

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